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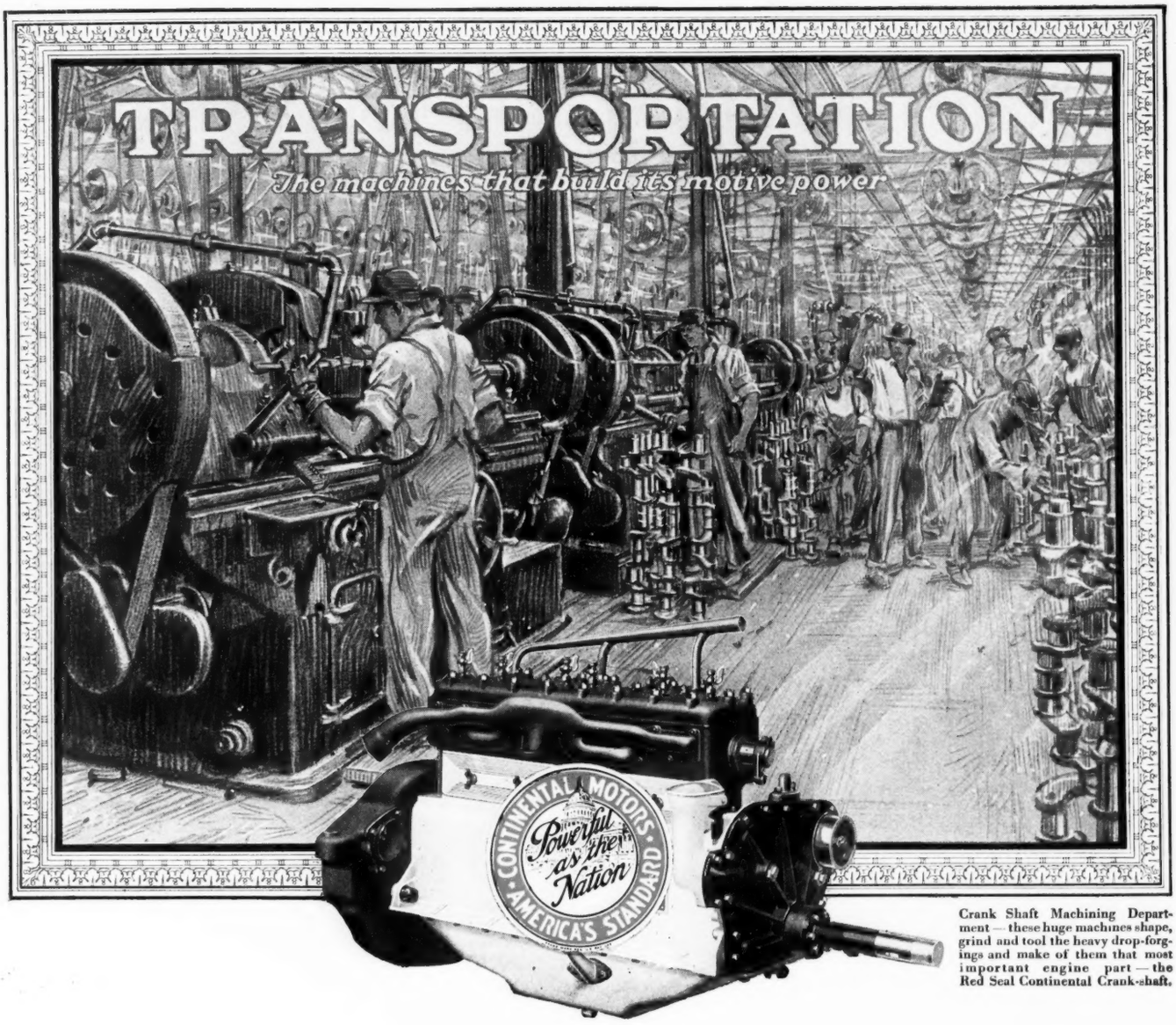

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Value of Automotive Statistics Is in Proper Analysis

An industry as new as that of automotive transportation has not defined its position precisely, hence its figures can be used intelligently only by a proper understanding of the factors affecting them.

By Clyde Jennings

FIGURES in the hands of the amateur statistician, or the non-statistician who does not inject an understanding of all factors into their application, are about as dangerous to the business world as high explosive bombs would be to an army if intrusted to inexperienced air pilots. The fact that torpedoes used for signals in railway traffic are constantly collecting a harvest of boys' fingers, does not lessen the fact that these torpedoes are extremely useful as railway danger signals.

These remarks are called forth by the current use of certain alleged automotive figures to prove various things.

The fact that automotive statistics are used as proving conclusively, without a due regard to other factors, the future trend of the business is a considerable indictment of the persons who so use them.

Automotive figures, when correctly interpreted, are a valuable guide for the future, but when used alone, without a due consideration of the daily shifting conditions, they are especially confusing. No capable student of the automotive industry to-day will contend that the percentage of development of the last years will be continued. Neither will this same student admit that the industry is near its peak of development. These conclusions are obtained by studying the automotive vehicle in connection with the people who use it. No study of the industry can be worth while that does not place facts as they exist above the theory of a few years ago.

It is more than passing strange that one of the favorite amusements of statisticians is (and has been for several years) a study of the saturation point of automotive vehicles. The writer has been a publicist for a number of years, but he does not recall ever having read a serious article on the saturation point of any other sort of transportation—which includes railroad cars, horses, mules, baby carriages and some other equipment.

When railroad cars are idle the answer is that business is below normal. When motor trucks are idle the answer is that there are too many trucks. No one apparently concerns himself as to why horses, mules and baby carriages are idle. The proper answer is, of course, that the truck being a freight vehicle will be active or idle just as there is freight to haul. Early last year there was an immense quantity of freight to be moved and all trucks were at work and there was an active buying of trucks. A freight slump came on, some trucks went idle and the buying demand fell off. This demand will come back when freight movement comes back to normal.

Now a few words about the passenger car. A good many people have been worrying themselves because

there are more passenger cars in use than there are families of more than $2000 incomes, as shown by some ancient income tax records. A reason for this worry is shown by listing the average expenditure of the theoretical family, which leaves no place for the support of a motor car.

There are two obvious errors in this reasoning, both of which any man can prove by mentally reviewing facts with which he is familiar.

First: Income tax records are not and never have been an accurate guide to the available incomes of the families of this country. It is a very well-known fact that few farmers are listed in income taxes, while they live in circumstances quite comparable with the city man who is listed at $5000 a year. A farmer may handle actually less than $1000 a year and still be quite well off and have more money for personal expenses than a man who is well up in income, but without other sources of income. Income is a very poor measure of buying ability, unless one knows well the ability of the buyer, and what is behind the income. All of us know well families that practically live off of a flock of chickens, or off of a garden that the family cultivates as recreation, and which find no way into an income tax return. Also each of us knows some housewife who buys twice as much with the family income as another housewife. Some families are poor on a $2000 income, while others ride in motor cars and go to picture shows.

So far as we have been able to find in reading several hundred articles on the saturation point, no one has ever taken these facts into consideration.

Incomes Earned by Use of Cars

Second: In the estimate of an arbitrary figure that governs the ownership of a motor vehicle, we have never seen the point made that a good many men whose income is rated at $1200 or thereabouts, earn this income because they are the possessors of a motor vehicle. Is any one of these amateur statisticians prepared to say how many second-hand motor cars, sold for something like $300 each, have been turned into taxicabs and jitneys and are earning a living solely because they own this vehicle?

There is in New York a family that recently was comparatively wealthy. After the crash a high powered, expensive motor car was the sole possession, aside from household furniture. But the housewife was a resourceful woman. She has not only been supporting the family but has accumulated some savings from the operation of this vehicle at good prices for well-to-do visitors in the city.

Again, corporations are seldom counted when it comes to the ownership of motor vehicles, and yet some of them own thousands of the kinds of vehicles that are not usually thought of in this connection. Think, for a moment, of the low-priced roadsters that are owned by corporations and which are operated daily by men who do not come into the high ranking income class.

Another instance of error: The Delaware registration list reveals that one man in that State caused to be registered at one time 11 motor vehicles. Later some others were registered. These vehicles were for use of his family and for the business of his estate. This man also has at least two cars registered in New York. All of these vehicles are for the individual use of himself and his family.

A few years ago one of the favorite arguments for a limitation of the ownership of motor vehicles was that the farmer would have nothing to do with them. The amateur statistician apparently has not yet realized the extent of farm ownership, which is not in the slightest comparable with income taxes. A farm hand, who is given house rent, a garden plot, the use of a cow and a few other favors by his employer in addition to his $50 a month, is a very legitimate motor car owner, if he patronizes the used car market, keeps down the initial investment and does his own repairing.

Recently there has been an epidemic of depreciation figures—most of which are entirely out of reason. The source of these was apparently with the railway statisticians who are well able to average depreciation of their own products. The circumstances are entirely different. All railroad equipment is handled by hired men and under given conditions. Its ownership is a matter of accurate record. The workmanship involved in the building is about the same. There is a condition easily averaged under the long period covered by railroad equipment since it has been fairly representative of the population.

But with motor cars it is different. The source of supply is vastly different and the workmanship is different. Also the various vehicles are not always used for the purpose for which they were intended and the conditions under which they are used is as different as the condition of the several highways over which they are used, plus the handicap of the ability and temper of the driver.

The real facts concerning the depreciation is that it is not an average in keeping with the life of the vehicle. Here, again, figures have been used without understanding. It is true that mathematics have shown that the life of a vehicle is 5.3 years with the figures now available. One difficulty with these figures is that they do not cover a long enough period. Even approximate figures on national registration are not available before 1912 and those of us who have had to do with the compilation of registration figures know how faulty these figures are. That these figures are inadequate every person who has had to do with them knows perfectly well. They are probably more, much more in error, than the production figures. Here is an instance which shows that some knowledge is required to properly use these figures:

Orphan Cars in Kansas

The recent statement of the Secretary of State of Kansas shows that there were in that State during the last registration year more than 1000 cars which were orphans in 1913 at the latest. In other words, the factories which made these cars quit operations in 1913. Also there are in Kansas 200 cars which have no manufacturer. These cars were built by mechanics for their own amusement and their own use of parts of wrecked cars and parts from other sources.

Recently a banker's statistical company estimated that there were 500,000 motor vehicles in this country that were not registered in any State. This figure may sound surprisingly large, but the more attention that is paid to this feature, the more the student is inclined to believe that the figure is quite conservative.

The effort is not made here to assert that automotive figures are not worth while. They are, decidedly so. The point is that they must be used with some understanding and the person who uses these figures must have a fair knowledge of the source of them before he uses them. Last fall some persons within the industry became quite excited over a pamphlet published by a weekly paper seeking automotive advertising as to the replacement market. The fact that this job of chart making was based on only part of the figures of the industry apparently made no difference as to its acceptance. Just why it was so widely accepted has never been explained. The

fact that the export figures were not mentioned in this pamphlet should have shown that it was made without thought or knowledge of the field.

Depreciation of automotive vehicles as a whole is a peculiar topic and when the final word is said there are many factors that will enter into the compilation.

First, there is such a great variety of vehicles, used in so many different ways that an average is very difficult without some intimate knowledge of the subject. The low figure for the average life of a vehicle is undoubtedly due to the hard use given to the light, low-priced vehicles, which probably are 50 per cent of the total registration. But should these be allowed to determine the depreciation for the entire industry? That is quite another question and one that must be carefully considered. Frankly, it would appear that an accurate average is almost impossible.

The state of mind of the users of the 9,000,000 vehicles is a factor to be considered in this connection. It would not be possible in railroad statistics to entirely cut out wreckage of equipment for one year. But that is what happened with the automotive industry in 1918. That year there were 8000 more vehicles at the end of the year than at the beginning with all of the production added. The observing student of the industry did not see anything extraordinary about this, as he was well aware of the vehicles in the used vehicle dealers' stocks and of the vehicles that are allowed to remain in shelter during an entire year without registration. When a season comes along that vehicles are in great demand and new vehicles are not available, then a lot of these vehicles that had been set aside are brushed up, oiled and put into use. And be it said to the credit of the builders, that these ancient vehicles give excellent service when they are called upon.

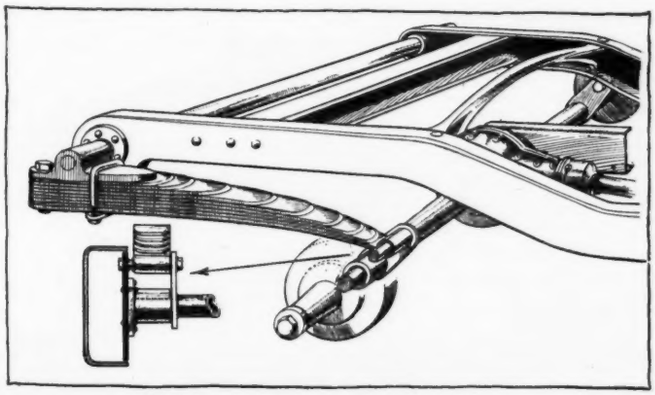
The object of this effort is not to belittle such statistics of the automotive industry and of automotive vehicles as are available. It is merely an effort to prove that the person who interprets these statistics must be a person of understanding and that he must draw on his knowledge of the industry as well as the statistics available. There are well-defined sciences of probability and of correlation, by which it is possible to interpret statistics into working figures. This industry is new and overturning of regularity within the industry during the war has done much to make our figures extremely difficult to apply to regular business.

The growth of the industry, its wonderful industrial romance and its unparalleled success has made it a target for all manner of marksmen. Most of these marksmen have had not the slightest knowledge of their ammunition. This fact has been well known to the close students of the industry and they have been cautious about putting forth figures and especially conclusions. But where those who knew the industry best hesitated, those who knew the industry least have not feared to enter. The result is that there are reams and reams of statistical pages about our industry that, if they were only entertaining to the public, would do no harm, but they are read by many who accept them as meaning something.

Axle Anchorage of Cantilever and Quarter-Elliptic Springs

A POINT worthy of consideration in connection with the anchorage on the rear axle of cantilever and quarter-elliptic springs occurs in the Bugatti light car, which is said to have extraordinary road-holding qualities. One feature of this car's suspension is the peculiar mounting of the quarter-elliptic springs on the frame. The thick ends are attached to the rear end of the frame while the thin ends project forward. The thin ends of the springs are attached to pivot pins mounted in front of the vertical center line of the axle as the accompanying sketch indicates. By this arrangement the rear weight of the chassis is imposed on the driving axle in such a manner as to balance, to a large extent, the driving torque.

When, as is usual practice, cantilever or quarter-elliptic springs are mounted immediately above or below the center of the axle, the road wheel, when it comes down to the ground after surmounting a bump, momentarily decelerates and reacts upon the driving axle, causing the latter to turn backward slightly and "kick up" the front end of the torque tube. This in turn tends to lift the front end of the car, diminishes the load on the front axle springs, intensifies the rear axle load and sets down the rear springs so that these are trebly punished by load, impact and torque, all this occurring at a moment when the front springs are relieved and thus intensifying fore and aft pitching.



Spring mounting on Bugatti light car

In the case of the Bugatti, when the wheel with its backward reaction on the axle comes down to earth, at that moment precisely the load also comes down on to the axle with its forward reaction. Thus one balances or tends to balance the other, with the result that the front end of the chassis is not lifted, the rear springs are not excessively flexed, rebound is less and pitching fore and aft does not occur.

The foregoing is, at all events, the explanation put forward by a critical user in England, and as already suggested the possibility of there being advantages worth having in the Bugatti arrangement makes it desirable that further experiments be made.

THE use of cast iron blocks for road construction is advocated by a metallurgical concern in France which induced the Municipality of Lyons to reconstruct an experimental stretch of road with such blocks a year ago. The results are said to have been good under heavy traffic, and it is reported that the system would be largely adopted if it were not for the difficulty of providing the necessary funds. The surface is first prepared with a layer of concrete about 4 in. thick, on which is placed the same thickness of neat Portland cement, carefully leveled to receive the cast iron blocks. The blocks are laid with spaces between them, and they are bound together with concrete, which is carefully rammed in to combine with the cement bed before the latter sets.

A New Form of Air Cleaner

Performance characteristics of the Stewart air washer; and a description of test methods and apparatus employed in the examination of this class of automotive apparatus under a wide range of conditions.

By P. S. Tice*

WHILE the obvious prime function of an air cleaner is that it shall remove the greatest possible percentage of foreign matter from the air drawn through it, there are other important considerations involved in the design of this class of apparatus. Chief of these latter is that the cleaner shall cause a negligible throttling of the engine intake. A further important point, if the cleaner is a wet one (properly a washer), is that the consumption rates of the water shall be reasonably small.

It is somewhat outside the purpose of the present discussion to go extensively into the relative merits of wet and dry types of air cleaners. However, experimental evidence shows that: (1) A given high standard of cleaning efficiency is attainable with less intake throttling in the wet than in the dry type cleaner; (2) in the wet type cleaner, accumulation of dirt removed from the air neither increases the throttling of the engine nor reduces the cleaning efficiency of the washer, and (3) use of a wet type cleaner results in a valuable humidification and cooling of the air supplied the engine.

In the design of the Stewart air washer, shown in section in Fig. 1, it has been sought to combine the maximum in cleaning efficiency with negligible intake throttling and minimum water consumptions.

Water Consumption and Cleaning Efficiency

When the study and development of air washers was undertaken it very early became apparent that the usual high rates of water consumption in wet type cleaners resulted from failure to remove entrained water globules from the air stream. Furthermore, such entrained liquid is charged with the materials it is sought to remove from the air; and, if liquid thus passes out of the washer with the air, the purpose of the washer is defeated to just the extent that this water loss is permitted. For these reasons the washer design under discussion has been developed to a point where no entrained water globules pass out of the washer with the air stream. Realization of this condition conserves the water supply and contributes materially to the high cleaning efficiency attained.

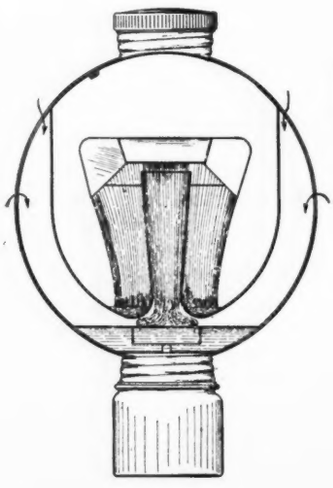
Referring to Fig. 1 it is seen that the washer as a whole is divided by a partition into a reservoir chamber and a washing chamber. The former is provided with a large filler opening and has two points of communication with the washing chamber—a water passage by way of the spring-seated flap valve which forms a part of the drain fitting, and an air vent tube rising to a point above the level of the liquid in the reservoir chamber.

When the filler cap is removed the flap valve closes automatically and the reservoir can be charged with water. Upon screwing in the filler cap, the flap valve is opened and water flows into the washing chamber, fills the glass trapping jar and rises to a height which submerges the lower end of the vent tube mentioned above. The filler cap being seated air-tight upon its gasket, water stops flowing to the washing chamber when the lower end of this vent tube is sealed by the rise of liquid, and flow is resumed only upon loss of liquid from the washing chamber sufficient to break the liquid seal of the vent tube. The vent tube thus determines the height of liquid in the washing chamber and serves to maintain a substantially constant level in it.

Water Spraying

Within the washing chamber is mounted a symmetrical air duct having two throats formed in it, both throats standing below the water level and each being provided with a set of water entrance holes or jets. The

*Engineer in charge of Carbureter Division, Stewart-Warner Speedometer Corporation.



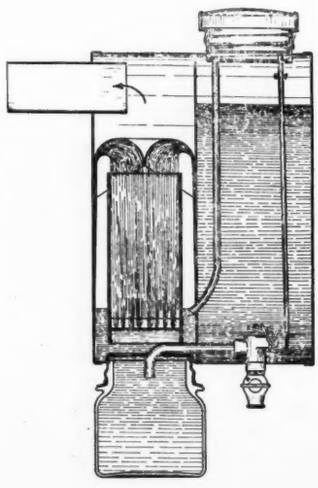
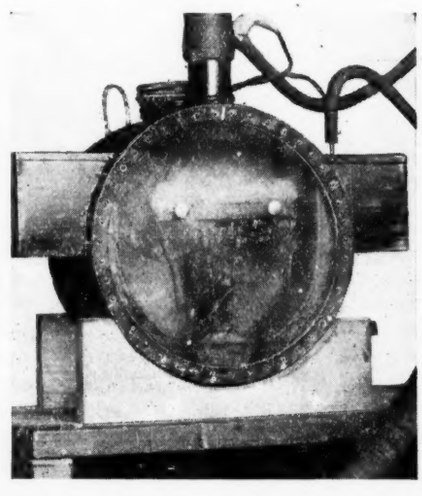
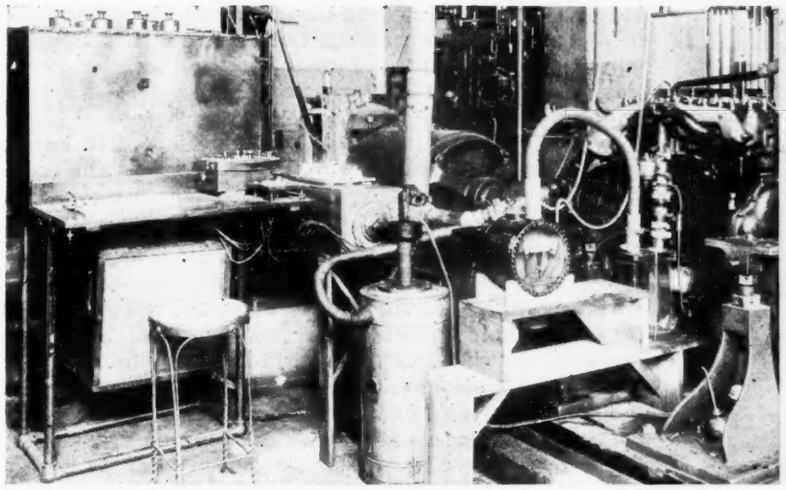


Fig. 1 — (left) — Sectional views of the new Stewart air washer showing paths followed by the washing water, and method of controlling the water level. Fig. 2—(right) — How the sheet of water looks as it runs down the washing chamber wall. This view resulted from a three-minute exposure, with air passing at the rate of 4200 cubic feet per hour





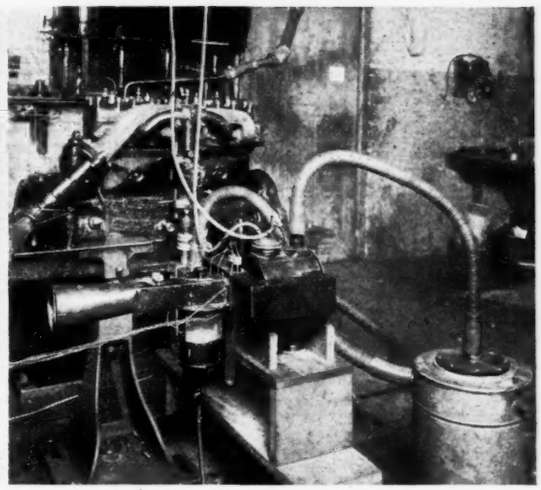


Fig. 3—(left)—General view of the apparatus set-up used in determining the effects of atmospheric humidity and temperature upon performance of the washer. Fig. 4—(right)—The set-up for examining the cleaning efficiency, showing the special entrance duct with its dust dispensing chamber, and the drum containing the vacuum sweeper bag

air duct is so proportioned that the least pressure throughout the washer exists at the water jets, thus applying a head or pressure difference across the jets, just as in a carbureter. This effective head is, of course, augmented by the gravity head due to the height at which liquid stands in the chamber above the jet holes in the air duct wall.

Air being drawn through the duct encounters sheets of water spray in the duct throats, establishing very intimate contact between water and air, with the result that foreign materials in the air stream become wetted and are taken into suspension in the water.

As the air charged with water spray leaves the common vertical member of the air duct, it encounters a deflector plate so formed and mounted with relation to the duct that all the water globules are forced into contact with the concave surfaces of the deflector. It will be noted that the end walls of the washing chamber engage tangentially with the discharging edges of the deflector. For this reason, the film of water established on the deflector remains unbroken and passes down the end walls in continuous smooth sheets, without splashing, and with none of it again becoming entrained. The photographic view in Fig. 2, of a washer with a celluloid end wall, shows very clearly the nature of the water flow on these walls. This view was made with an air flow rate of 4200 cu. ft. of free air per hour.

Circulation of Water

Water returned to the bottom of the washing chamber from the deflector carries with it the dirt, which settles out into the trapping jar, from which it can be removed as required. The washing chamber water is continuously recirculated as above, bringing the dirt down with it; and the water lost by evaporation is made up by fresh water admitted from the reservoir as required.

To drain the whole washer, the drain cock is opened with the filler cap in place. If one desires to clean the trapping jar without loosing the contents of the reservoir, the filler cap is removed, thus closing the flap valve between the two chambers. Opening of the drain cock then permits only the contents of the washing chamber to run out, down to the level of the end of the tube extending into the trapping jar, as seen in Fig. 1. The jar can then be removed without spilling any of the dirty water.

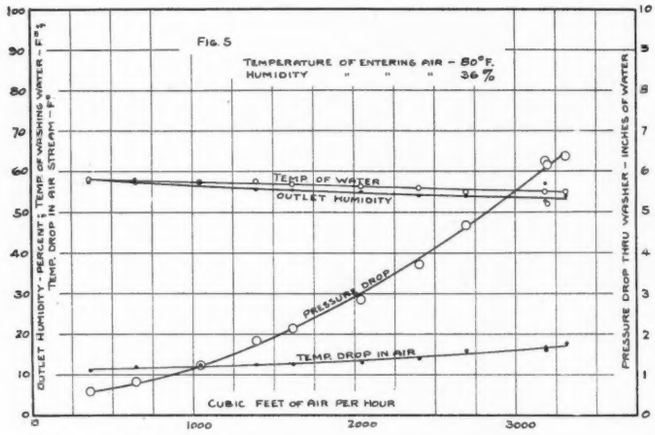
A very complete experimental examination has been made of this air washer, for the purpose of determining its cleaning efficiencies and pressure losses at various rates of air flow, its rates of water consumption with respect to temperature and humidity of the atmosphere and its effects upon the humidities and temperatures of the air delivered to the engine under various atmospheric conditions.

The apparatus used in this work included an orifice type air meter, and electric heater for controlling the temperature of the air entering the washer, a humidifier for controlling the water vapor content of the air entering the washer, a trap for removing from the air stream any water globules carried from the humidifier in entrainment, special passages soldered to the air intakes of the washer with provisions for wet and dry thermocouples and a large glass chamber interposed between the washer and the engine. The last mentioned chamber was made of glass so that should any water be carried over from the washer, it could be instantly detected. This glass chamber also contained wet and dry thermocouples for determining the humidity and temperature of the air leaving the washer. A Leeds and Northrup potentiometer indicator and a Hinkley 4.00 x 5.25 x 4-cylinder engine completed the set-up, as shown in Fig. 3.

For determining the cleaning efficiency of the washer, a dust-dispensing member was attached to the washer entrance. This portion of the apparatus, shown in Fig. 4, consisted of a horizontal passage through which the air was drawn into the washer. Secured to its under side and opening into it, was a chamber having a steep conical bottom, into the apex of which a small stream of compressed air could be introduced. A quantity of dust placed in this lower chamber could thus be dispensed into the air stream in a thoroughly distributed state, and at any rate desired. A large size Hoover vacuum sweeper bag, which had been proven to have a dust-retaining efficiency of 100 per cent under the conditions of the tests, was mounted in a large galvanized iron drum, and was interposed between the washer and the engine intake with connections so made that the air from the washer passed from the interior of the bag into the drum and thence to the engine.

Observations of the following quantities were made in each run:

A —air weight in lbs. per sec.,
t —temp. deg. Fahr. of air at air meter,
H —barometric height, mm. Hg.,



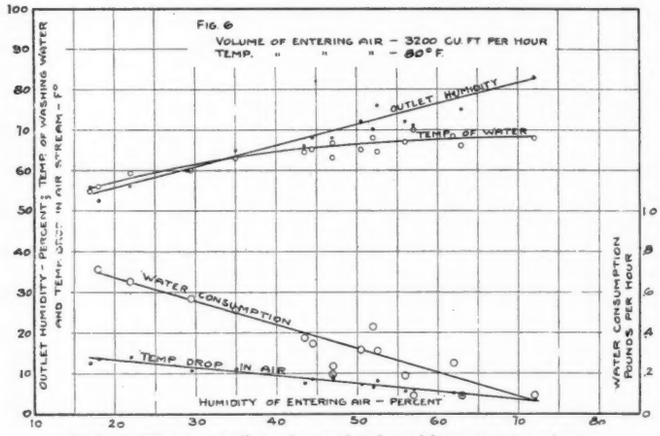


Fig. 5—The variations in outlet humidity, temperature drop and pressure loss, with change in the rate of air flow through the washer. Fig. 6—Effects upon water consumption, temperature drop and outlet humidity, of change in atmospheric humidity at the washer entrance

DB_1—dry bulb at washer entrance,
DB_2—dry bulb at washer exit,
WB_1—wet bulb at washer entrance,
WB_2—wet bulb at washer exit,
t_w—temp. deg. Fahr. of water in washing chamber, and
h —pressure drop through washer in inches of water.

From these quantities were computed the relative humidities, water consumptions and temperature drops shown graphically in the curves.

Method of Conducting Tests

In all of the test runs observations were recorded only after all temperatures had remained constant for one minute or longer. Three groups of runs were made:

(1) With temperature and humidity of entering air at constant values, and with the quantity of air varied, to determine the relationships between quantity of air aspirated and changes in humidification, pressure drop and temperature drops in both air and washing water.

(2) With the weight of air and its temperature at the washer entrance at constant values and its humidity varied through wide limits, to determine the effects of the humidity at the washer entrance upon outlet humidity, water consumption and temperature drops in both the air and washing water.

(3) With the weight of air and its humidity at the washer entrance at constant values and its temperature varied through wide limits, to determine the effects of temperature at the washer entrance upon outlet humidity, washer consumption and temperature drops in both air and washing water.

A fourth set of runs was made, in which, at each of several air flow rates, the cleaning efficiency was found by dispensing a known weight of dust into the air stream entering the washer and comparing with these quantities the weights of dust passing the washer. Any dust passing the washer was caught in the sweeper bag discussed above; and its weight was determined by careful weighings of the bag before and after a run, the differences between these weights being taken as the weights of dust that had passed the washer.

Quantity of Air Varied

In the runs involving constant entering air temperature and humidity, with the weight of air varied, Fig. 5, it develops that the change in outlet humidity with change in air velocity is very small. This is also true of the temperature of the washing water, and of the temperature drop in the air stream. It can be argued from these curves that increased air velocity causes, in this washer, a very nearly sufficiently finer division of the liquid to counterbalance the effect of reduced duration of contact between the air and water. The entering temperature and humidity selected and maintained in this group of runs (80 deg. Fahr., and 36 per cent) approximately represent average summer conditions in the Middle Western States.

The pressure drops through the washer are seen to be relatively very small, considering the intimacy of contact established with the water and the high values of the cleaning efficiency, as shown in Fig. 8.

In none of the runs here reported was it possible to detect the carrying out of water from the washer, in entrainment in the air stream. As a matter of fact, except for the sheets of water running down the end walls of the washing chamber from the deflector, the interior walls of this chamber remained absolutely dry under all conditions.

Entering Humidity Varied

Maintaining the entering air temperature at 80 deg. Fahr., as before, and operating at about the maximum quantity of air, the entering humidity was varied from 18 per cent to 72 per cent, Fig. 6, with the result that the humidity at the washer outlet is shown to vary directly with that at the entrance. The temperature drop in the air stream varies, of course, inversely with the entering humidity, at a constant entering air temperature. The water consumptions found are represented wholly by the amounts evaporated, since none was carried over in entrainment. The water consumption rates found are comparatively very low, considering average wet cleaner practice, in spite of the much greater humidifications accomplished in this washer.

Entering Temperature Varied

Operating with the same air quantity as before, and with an entering humidity of 40 per cent, the temperature of the entering air was varied from 72 deg. to 108 deg. Fahr., Fig. 7. In these runs both the temperature of the washing water and the temperature drop in the air stream are shown to be direct functions of the entering air temperature; while the curve of outlet humidity at first rises sharply, but rapidly flattens out. The water consumption curve is very interesting, as showing what really low values may be expected in service, under average conditions with respect to entering humidity. At the entrance temperature of 80 deg. Fahr. the consumption is .40 lb. per hr., at an air rate of 3200 cu. ft. per hr., corresponding to open throttle at about 1100 r.p.m. of the engine used. With a water reservoir capacity in the washer of one gallon (that employed in this

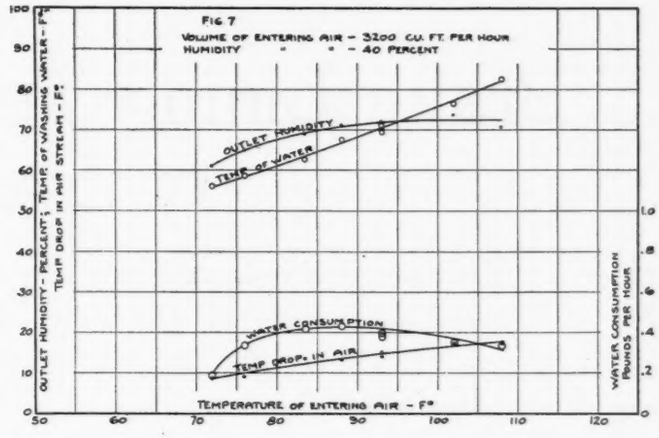
size of washer), it is seen that continuous operation for approximately 20 hours will be secured on one filling of the reservoir.

In the determinations of the cleaning efficiencies only the lightest and most difficult removable materials were employed. These were flour dust, thoroughly distributed in the entering air by the means discussed under the heading "Apparatus," and the finer of the sweepings from one of a new cement floor. This latter material is largely made up of extremely impalpable particles which remain in suspension in still air for great lengths of time.

In Fig. 8, showing the cleaning efficiency curve, it is stated that the average rate of dust supply was .858 lb. per hour. This is true, as an average for all four runs. But that point at an air rate of 2840 cu. ft. per hr. resulted from a rate of dust supply of 1.86 lb. per hr., which is enormously in excess of any service rate. The points of particular interest in this plotting are the high average cleaning efficiency, the small variations in cleaning efficiency with wide changes in the air flow rate, and the negligible effect upon cleaning efficiency of wide variations in the rate of dust supply.

The data here presented shows that a minimum cleaning efficiency of 97 per cent can reasonably be expected in service, with an entirely reasonable water consumption, and with an almost negligible restriction of the engine intake. At the same time the humidification and cooling of the air in its passage through the washer constitute obvious advantages for heavy duty service.

A group of ten of these air washers has been in experimental operation on a fleet of Diamond T trucks engaged in cement road building in central Illinois; and over a period of sixty days use the mean dust removal per car per ten-hour day has been approximately 4.4 cu. in., with a mean water consumption per car per day of somewhere between .5 and .6 gallon.



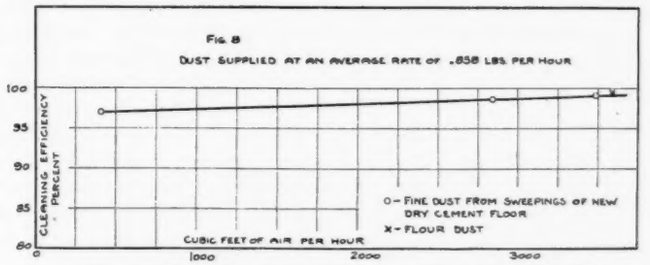


Fig. 7—How the temperature of the entering air affects water consumption, outlet humidity and temperature drop in the air stream through the washer. Fig. 8—Variation in cleaning efficiency with change in air flow rate, using very fine dust thoroughly distributed in the air stream entering the washer

Cushion Tire for Heavy Trucks

A NEW type of truck tire has been marketed by the Firestone Tire and Rubber Co. known as the Firestone Giant Cushion tire. The new design is a development of the small cushion tire and the giant single groove solid. It will be made in sizes suitable for all sizes of truck from ¾ ton to 7½ tons. One advantage over plain solids claimed is that the tire will stay livelier until it is worn out. This tends to lessen the power required to move the truck, and it also reduces the tendency of the edges of the tire to break off due to abuse by operators. The tire is designed in accordance with S.A.E. standards.

Firestone giant cushion tire

Bowen grease or oil gun for chassis lubrication

A Pressure Lubricating System

A SYSTEM of chassis lubrication whereby either grease or oil may be forced to the bearings under high pressure has been evolved by the Bowen Products Corp. It comprises one grease or oil gun and three types of dust-proof connections—straight, 45 deg. and 90 deg. The elbow connections are made for greater convenience in applying the gun to bearings which would be more or less inaccessible with the straight connection. All three connections are made in a number of different threads, and adapters are furnished for use on spring bolt heads and other similar places. For places where the lubricant is apt to be thrown out by centrifugal force the connection is fitted with a ball check valve.

For convenience in lubricating, the connectors are made with revolving caps, which make it possible to operate from any position. These caps are fastened to the connection and are easily snapped open and closed with the tip of the gun. These caps cannot be lost, and their use obviates the need of cleaning the connections each time the gun is used.

Among the claims made for the system are that it can be operated with one hand, will handle all grades of oil and grease, is quick and convenient and cleans as well as lubricates.

Brake Lining Tests at the Bureau of Standards

Trials of numerous samples under a variety of conditions show a wide variation in coefficient of friction and other characteristics. Some linings prove far more durable than others under identical test conditions.

THE Bureau of Standards in co-operation with the Motor Transport Corps and the Society of Automotive Engineers has been engaged for several months in making tests of brake lining materials primarily with a view to developing a standard testing method which would enable purchasers and manufacturers of such linings to intelligently determine what specifications these linings should be required to meet.

A report on the work accomplished to date was recently made at a meeting held at the Bureau and attended by representatives of many of the prominent brake-lining manufacturers.

Director Stratton of the Bureau opened the meeting with a short address in which he assured those present of the desire of the Bureau to co-operate with manufacturers in just such work as has been done on brake linings. Dr. H. C. Dickinson, under whose direction the brake-lining tests are conducted, stated that the Bureau has been engaged since December, 1919, in brake-lining investigations intended to determine the best procedure for the series of tests originally proposed. The Bureau has completed a large portion of the program which it was decided at that time to follow.

Mr. Von Ammon, who has been in immediate charge of the work, then made a report from which the following is abstracted:

The primary tests were intended to determine the durability of the brake lining in two types of runs, the first in which the temperature of the brake drum is kept approximately constant by the use of cooling water and the second, a severe service test, in which the temperature of the drum is allowed to rise to equilibrium with constant power absorption. Means for determining the coefficient of friction under various conditions were also to be provided and certain other less important tests were to be made.

The testing apparatus adopted for the purpose was described in AUTOMOTIVE INDUSTRIES for April 7, 1921. The two brake-lining samples used in each test are 2 in. wide, ¼ in. thick and 11 in. long, each covering 90 deg. of the circumference of the 14-in. steel drum employed. The samples are secured to the steel shoes by means of 8 tubular brass rivets. The samples furnished by the manufacturers included practically all linings now in the market as well as a number in course of experimental development.

Coefficient of Friction

During the long time run with cooled drum the coefficient remains more nearly constant than in hot tests. The average values were near .40, in some as low as .30, while in a few samples only were the averages over .50. The extreme values were approximately .28 and .60.

During the severe service run, hot tests, there was in most cases a marked drop in the value of the coefficient resulting from evaporation and carbonizing of impregnating materials. This is followed by an increase in the coefficient which, during the remainder of the run, shows less variation. During the latter period the average coefficient for most linings was found to be from .45 to .50; a few linings showed an average value nearer .40, while others showed nearer .60. The extreme values found during short periods were .75 and .12, the lowest values being reached during the first part of a run as referred to above.

The influence of oil on the coefficient of friction was determined on the water-cooled drum. New samples saturated with oil, and with oil constantly supplied showed a coefficient between .10 and .20. After discontinuing the supply of oil the coefficient rose in 15 to 30 min. to values between .20 and .30 and were then steadily maintained.

Durability Tests

A large number of tests with water-cooled drum were conducted with various drum speeds and various power inputs. In some cases the linings tended to cut the drum and steel particles became imbedded in the lining and added to the scoring. Even with low unit pressures metal was sometimes found imbedded in the lining after one to three hours' running. It was found that if conditions of load and speed are so chosen that no linings in commercial use gather metal the time required for a test will be inconveniently long or if shortened will result in so small a wear that the conditions of wear and change of coefficient of friction at the heart of the lining will not be sufficiently well shown.

In order to determine the best condition of speed and power absorption in the hot, or severe service test, a considerable number of trials were made at various speeds from 300 to 1000 r.p.m. with power inputs varying from 4 to 10 hp. The combination of 6 hp. and 600 r.p.m. promise to be the most satisfactory while limiting the test to a reasonable length of time. A majority of linings required a test period of between 3 and 7 hrs. The maximum run was 16 hrs. for an experimental lining.

In all severe service tests there is, very soon after the load is put on, more or less smoke and the impregnating materials evaporate or burn out to a varying extent. The condition of the drum at the conclusion of a run was always good, but in many cases there accumulates on the drum a coating of varying quality. With some linings this coating was smooth, with others rough, sometimes both at different times.

Supplementary Tests

Tests for determining the oil and water absorption were made by submerging specimens of lining in the liquid. It was found that oil absorption amounted from 7 to 30 per cent by weight, and the water absorption from

4 to 27 per cent. It was found that the change in thickness resulting from absorption is too small to cause linings to drag under any normal condition of use.

Some linings show a tendency to stick when allowed to cool on a hot brake drum. With a few samples allowed to cool in this manner it was found necessary to apply from 0 to 36 ft. lb. to overcome the sticking, some rubber linings showing the higher values in these limited tests, while with the woven linings tested the dry carbonized impregnating material seem to form a coating which prevented sticking.

Discussion

Mr. Carson of the Johns-Manville Co., pointed out that in such composite materials as brake linings, consisting of asbestos, cotton, wire and impregnating compounds a uniform coefficient of friction cannot be expected in any case. The coefficient is certain to vary as wear exposes new layers. The more homogeneous the material is the more uniform the coefficient will be. Neither maximum nor minimum should be taken, but rather average values from the main portion of the run.

He was strongly of the opinion that test conditions should be so chosen as to eliminate the picking up of metal in the cold test by reducing the power absorbed, while keeping speed the same as for the hot test.

It was agreed that the performance tests should form the foundation on which all specifications should be built. It was also felt that specifications should not prescribe in detail the amounts of various materials, such as asbestos, cotton, etc., entering into the make-up or methods of manufacture of the linings.

Mr. Burton offered continued co-operation of the Motor Transport Corps with the Bureau of Standards and the S. A. E. Standards Committee in developing specifications along these lines.

Centrifugal Castings

IRON castings made in metal molds rotated at high speed while the casting is being poured and cools have been made for some time for piston rings and other engine parts. According to *Engineering*, London, the first patent covering the casting of materials under centrifugal pressure was taken out by Eckhart in 1809. Many efforts to establish the process on a manufacturing basis have met with failure.

Stokes Castings, Ltd. of Mansfield, England, are now producing such castings on a considerable scale, the average output for the last few months having been at the rate of 2000 castings a week. Most of the castings are for internal combustion engine work, mainly piston ring pots and cylinder liners. Satisfactory machining qualities are said to be obtained without annealing the castings. Factors determining the qualities of the castings are the mixture, pouring temperature, die temperature, speed, etc.

Engineering states that the quality of the castings obtained is a marked metallurgical advance over the material cast in sand molds or stationary chills, and graphite plates are practically eliminated. For piston ring castings made by the centrifugal process it is claimed that the dirt and slag inclusions inevitable with any sand casting process, are squeezed out by the centrifugal force. Another advantage claimed is that the rings cut from the pot are uniform throughout instead of varying in quality from end to end of the pot, as in the case of pots cast vertically in sand. A manufacturer of internal combustion engines using a cast iron liner only a few millimeters thick, who had a great many wasters when using sand castings for the liners, was able to avoid practically all wastage when using these centrifugal castings.

The casting machine is direct-driven from a variable speed electric motor through a flexible coupling and friction clutch. The floor space occupied is about 12 x 3 ft. and a weekly output of between 3000 and 4000 castings is obtained from six machines. No floor space is occupied by moulding boxes or sand-mixing appliances, and waste of material is largely eliminated owing to the absence of headers, risers, etc. The time taken to produce a 6-in. diameter drum, counting from the time of pouring into the receiver on the machine to time of taking out the completed casting, is something under a minute.

Stokes Castings have up to the present largely confined their research to the question of grey cast-iron, but interesting experiments have been made with some of the non-ferrous metals, and analysis showed the interesting effect of the centrifugal action in that the tin and lead of a lead bronze had tended to fly to the outside of the casting, the Brinell hardness figures reflecting the displacement. For the analysis used it was estimated that an ordinary sand casting would give tensile figures of not much over 12 tons to the square inch, with an elongation of, say, 9 per cent. The centrifugal casting shows as high as 20 tons to the square inch a very marked improvement.

Fig. 1—Polished specimen of centrifugal casting. Unetched, magnified 50 diams, showing cellular distribution of graphite

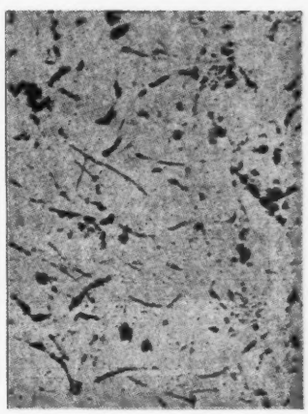


Fig. 2—Polished specimen high-grade sand casting. Unetched, magnified 50 diams. showing cellular distribution in the form of flakes

THE Paris Academy of Science has been informed by M. Guillaume, Director of the International Bureau of Weights and Measures, that the Japanese Parliament has passed a law making the adoption of the metric system obligatory in Japan. The metric system has been optional in Japan since 1893, when the decimal system was adopted side by side with the Japanese weights and measures. In China, the decimal system was adopted in 1906, and the metric system, adopted in 1913, should become obligatory in 1923. In Siam, the metric system has been obligatory since 1912. Thus the metric system has been adopted throughout the Far East, and in France it is thought that the decision of Japan will have a certain influence in Anglo-Saxon countries, since the opponents of the metric system in the United States, Great Britain and the Colonies have partly based their objections to it on the need of conserving the English way of reckoning in the East.

Combustion Phenomena Revealed by Indicator Cards

A discussion of experiments showing the effect of mixture proportions, ignition timing, cylinder temperature, and electrode temperature on the character of combustion. Heated spark plug is believed to be the final agent in causing knocking in most present day automobile engines.

By Victor R. Gage*

RECENTLY there have been many investigations made, and hypotheses advanced concerning the process, or processes, of combustion inside of a gasoline engine cylinder. The phenomena called detonation, pinking, or knocking, especially, have received much attention. The results herewith presented were obtained in an endeavor to produce detonation in an ordinary gasoline engine, and although detonation was seldom obtained, still much interesting information was secured concerning the general processes of combustion. This information may be useful in supplying a few of the many fragments of evidence which are necessary in order to complete the story of combustion.

Knocking and detonation, as well as other combustion phenomena, are inseparably connected with the quality of the mixture, the time of ignition, the density and temperature of the gases, and many other factors, such as turbulence, stratification and dilution.

The cards shown in Figs. 1 and 2 serve to show the effects of varying mixture only (Fig. 1) and of ignition timing only (Fig. 2). These two figures present both pressure-volume and pressure-time diagrams** for usual operating conditions and are similar to those obtained in the regular course of instruction in the Sibley College, Mechanical Laboratory, Cornell University.

For the other diagrams, Figs. 3, 4 and 5, the factors which were intentionally varied were temperature (Fig. 3) and ignition conditions (Figs. 4 and 5).

All of the cards were taken from a single cylinder, 6.55 x 9-in. gasoline engine, with compression ratio of 4.1 to 1. The general shape of the combustion chamber and spark plug location is shown in the accompanying schematic drawing, Fig. 7. The approximate valve timing of the engine is: Intake opens 20 deg. late, closes 30 deg. late; exhaust opens 20 deg. early, closes 10 deg. late. The engine speed was maintained at 350 r.p.m. by a hit-or-miss governor, so that every working cycle is made with the same throttle conditions. The air supply to the carbureter was unheated, being taken direct from the room at about 75 or 80 deg. Fahr., the gasoline being at the same temperature. The mixture had only a few inches to travel from the carbureter venturi to the intake valve, and in this passage it was neither cooled nor heated, except for the cooling effect of the vaporization of the gasoline. Commercial gasoline, "Socony" brand, was employed as a fuel, being supplied through a needle valve controlled opening located at the

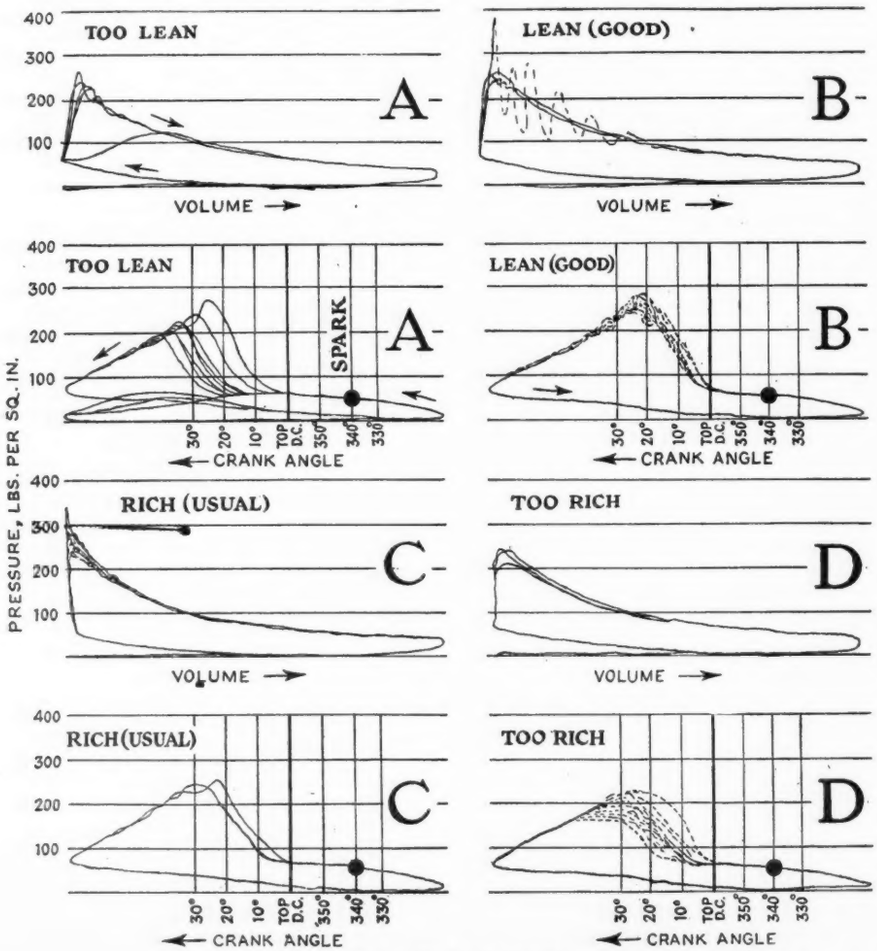


Fig. 1—Cards showing effect of varying mixture proportions

*Assistant professor of experimental engineering, Sibley College, Cornell University.

**Similar cards were discussed by the author in "Effects of Varying Mixture and Ignition Timing" (*Power*, Nov. 23, 1915).

throat of an air venturi, just as in the usual straight tube carbureters.

The engine set-up is excellent for qualitative demonstration work, but it is not adapted to complete quantitative determinations. The load was applied by means of a band brake, and could be quickly changed to meet new conditions, such as a drop of power caused by lean mixture misfires. As the governor is a hit-or-miss type, the band brake is constantly regulated so as to seldom permit a "miss" stroke, but still allowing an occasional "miss" to make certain that the speed has not been reduced. The use of this combination, i.e., hit-or-miss governing and a quick acting brake secures: (1) constant speed, (2) constant throttle or manifold depression, and hence (3) a constant indicated load, as every power impulse is a full load explosion, and (4) the elimination of carbureter variables. In order to avoid any possibility of doubt, cards were not taken until two or three consecutive explosions followed a miss stroke, the only exception being in the case of an extremely lean mixture, when it is desired to obtain a card showing a backfire through the carbureter. As a matter of fact, one or two consecutive misses do not change engine conditions enough to make any perceptible change in the following explosion, except, perhaps, with an extremely lean mixture.

The indicator was suitable for a much higher speed than that employed on these tests, being a light weight inclosed spring Crosby Gas Engine Indicator, connected with the combustion chamber by a straight and large size opening. The corresponding pressure-time and pressure-volume cards were taken with the same engine conditions, but not at the same time. In taking cards the pencil was held on to the paper for many explosions, so as to secure a complete record of all fluctuations for a given set of operating conditions. In Figs. 1 and 2 it is seen that there is a complete cycle of fluctuation covering wide ranges of pressure with too lean or too rich mixtures, whereas all explosions are nearly alike when the mixture is correct. The ordinary pressure-volume indicator cards were taken in the usual manner, but special provisions were made to study the characteristics of the rise of pressure after ignition. In the latter case the eccentric which actuates the indicator is placed approximately 90 deg. out of phase with the crank, so that at the time of ignition when the engine piston is at the end of its stroke, the indicator card is in the middle of its movement. The engine flywheel was graduated in degrees, and a calibration or key card was made enabling the crank position to be superposed upon the misplaced diagrams. The result is that the central portion of these cards, where the combustion is located, is practically a pressure-time diagram, equal angles being nearly equally spaced, although at the ends of these diagrams this is not true. However, these cards will be spoken of as pressure-time diagrams. The time of ignition is shown by a dot on the compression line, located by means of the fly-wheel calibration and the key card.

The effect of change of mixture ratio with a fixed spark is shown on Fig. 1, the usual pressure-volume cards (the upper card of each pair bearing the same letter) and the pressure-time cards (the lower card of each pair) are for the same conditions. The too lean mixture (cards A, Fig. 1) was the leanest at which the engine would run. It gives very erratic combustion. Sometimes the pressure does not rise at all, and it was at times necessary to choke the carbureter to prevent stalling. At other times, without having to strangle the carbureter, there would be a back-fire through the carbureter, which seemed to warm up the passages, so that the next time the spark passed a small pressure rise would occur, producing more heat and successively better pressure rises. The characteristic burning of this lean mixture seems to be that the spark properly ignites the charge, but that the heat generated by the burning charge is not sufficient. The lack of sufficient heat generation may result in a complete extinguishing of the combustion. It may result in a bare existence of the flame without any excess heat, so that the temperature of the mass does not rise, just as a piece of charcoal glows until the piece is entirely consumed. If this occurs it is quite probable that some portion of the charge is still burning when the intake valve opens, and so a back-fire will result. Or the charge may be ignited and burn in the regular manner, as shown by a few of the explosions which gave about 78 lb. indicated m.e.p.

For the next two cards (B and C, Fig. 1) the mixture was made slightly richer than the too lean condition, just enough richer to secure absolutely certain engine operation, with no back-fires or weak explosions, as was shown by the large number of pressure-time diagrams

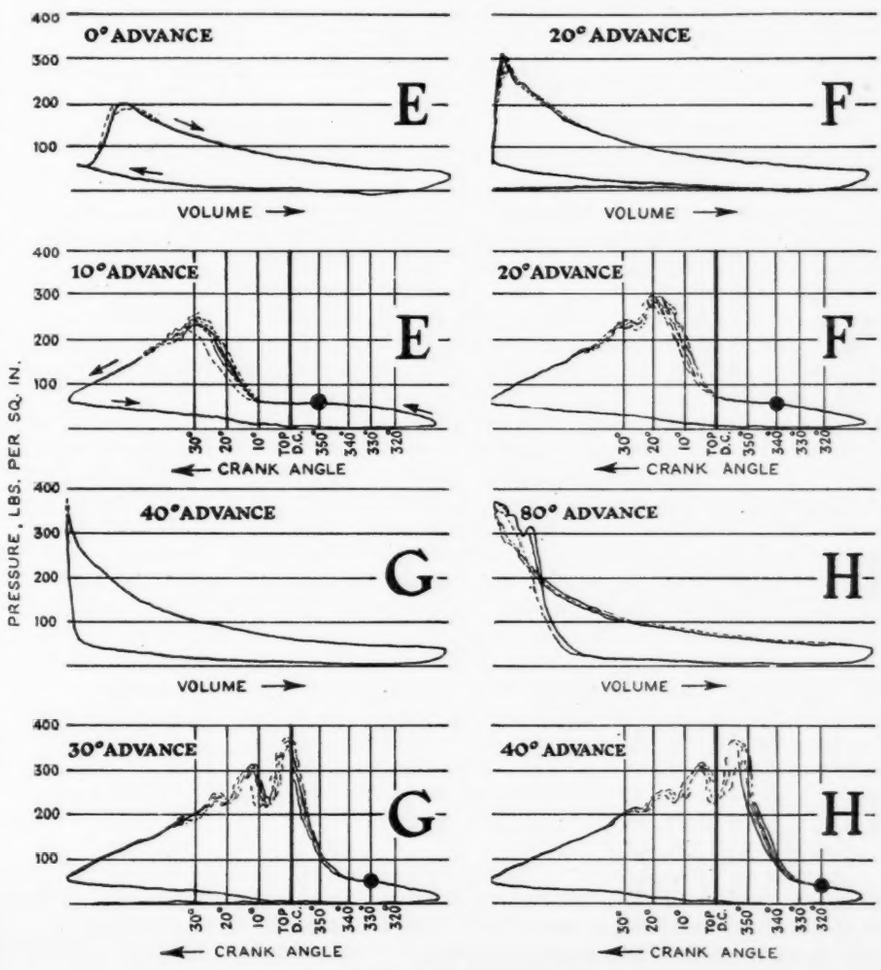


Fig. 2—Cards showing effect of ignition timing on combustion

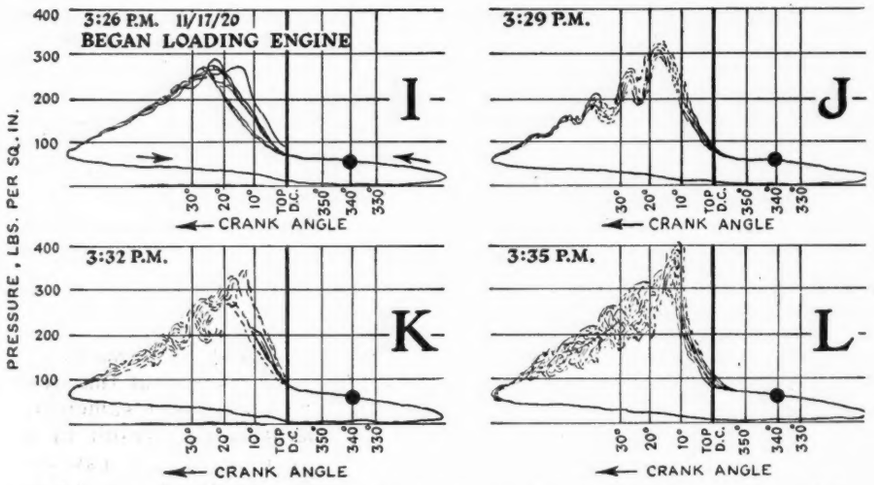


Fig. 3—Cards showing the effect of heating the engine. Time of ignition not varied

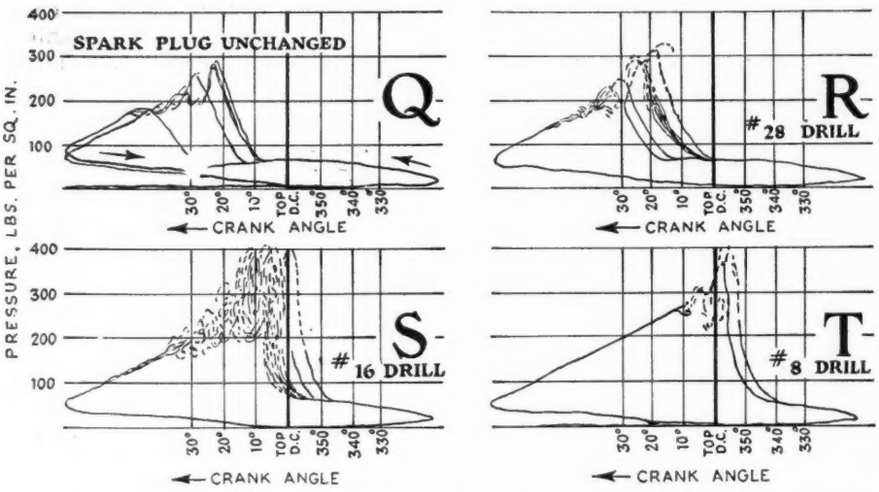


Fig. 5—Cards showing results of autognition brought about by plug shown in Fig. 6

which coincide. On the pressure-volume card one explosion (perhaps detonation) gave an exceedingly rapid rate of rise of pressure. This is shown by the excessive maximum pressure which was reached, and by the waves on the expansion line. A rapid rate of application of pressure upon the indicator piston acts just as a hammer blow, causing the parts to vibrate, whereas the usual (relatively) slow application of pressure acts simply as a gradual push upon the indicator piston. The action may be illustrated by the difference between pushing on a bar of iron, when no sound is produced, or tapping it with the same total pressure, but applying the pressure in a shorter time, when sound (vibration) is produced. In the optical type indicator, where the whole optical system is attached to the cylinder by an ell-shaped connection, the indicator waves may be produced by vibrations of the material of which the indicator is constructed, for example: in an inverted "L," one end of which is fastened rigidly to the engine cylinder, it is certain that engine vibration will cause the free end to move relatively to the fixed end. The richer mixtures never show appreciably indicator vibrations, because the rate of application of pressure is always relatively slow. Indicator vibrations increase with increase of the rate of application of pressure.

With the too rich mixtures the burning was always irregular, within limits, never refusing to burn and never burning very fast, as revealed by the several combustion lines of the last cards D of Fig. 1. The "rolling" of an automobile engine with a too rich mixture is due to this characteristic as well as to manifold distribution.

The rate of rise of pressure is slowed up by richening the mixture. The slope of the combustion line on the pressure time cards indicates the rate of pressure rise; the steeper the line the faster the burning. The too lean mixture, cards A, Fig. 1, often gave as fast, if not a faster, rise of pressure than the good lean mixture (Cards B), and yet more spark advance is necessary with the too lean than with the good lean, because the too lean mixture hangs fire so long after the spark has passed and before the pressure rise begins, even though it burns, as fast or faster after it starts. The too rich mixture, cards D, also requires more spark advance than the good mixture, because it is slow burning throughout combustion period. Both too lean and too rich mixtures give less i.m.e.p. than a good mixture. With a too lean mixture, although the maximum pressure is sometimes greater than with a good mixture, the intermittent weak explosions will reduce the power output for a given time. With a too rich mixture the maximum pressure is always low and the after-burning does not cause the expansion line to fill out sufficiently to build up the m.e.p.

In connection with the relative meaning of too lean and good mixtures, cards A and B, it was noted that, with constant air and fuel temperatures, a mixture which was too lean at normal cylinder temperatures and spark advance was made to burn like a good mixture with higher cylinder temperatures and with more spark advance. Most automobile engines have insufficient spark advance for a very lean mixture. The reason that a too lean mixture can be made normal by heating is perhaps explained by stating that the rate of combustion of a given mixture is controlled by its temperature and density at the time of ignition. If the temperature is increased, so is the rate of burning, because less heat is required to raise the mixture to its kindling temperature. If the density is greater (excluding liquid condition) the fuel and oxygen molecules are closer together and so unite more readily.

Density is proportional to the absolute pressure and inversely proportional to absolute temperature. Increasing the pressure at the time of ignition will increase the rate of combustion. This increase in pressure can be effected by an increase in temperature. But, in order to accomplish this the heating must be done after the intake valve is closed, when the cylinder is shut off from all outside passages, for under these conditions the volume will be constant and the pressure must rise with the temperature. If the temperature of the mixture is raised before the intake valve is closed the mixture will have a chance to expand back into the manifold or the air, and the volume occupied by a given weight will be increased, but no pressure change will occur. So it is possible to use a leaner mixture when the cylinder temperature and particularly the piston temperature is increased, or when a higher absolute pressure exists at the time of ignition, as with an increase of compres-

sion ratio. If a high compression engine is throttled this advantage is lost, because the absolute pressure at time of ignition is reduced. A change of spark timing either way from dead center causes ignition to occur at a lower pressure.

The foregoing statement that the rate and type of combustion is controlled by the temperature and density of the charge needs amplification. The total pressure was considered as a factor in the density. In strict truth, it is not the total pressure of the whole charge, but the partial pressure of the combustible elements which control the combustion. Knocking or detonation can be stopped by diluting the charge with inert gas, for example, by bleeding exhaust gas into the intake manifold. When this is done the total pressure at the end of compression is (hardly) changed, but, as the combustible elements are a smaller proportion of the contents of the cylinder, their partial pressures are much less than when the contents of the cylinder are not diluted with inert gases. Another factor affecting the pressure at the end of compression, but perhaps not a very big factor, is the heat taken up as latent heat when gasoline is vaporized during compression. The pressure at the end of compression will be higher with pure air than with a gasoline-air mixture and will be higher with a lean mixture than with a rich one, as more gasoline is vaporized when more is present, so both temperature and pressure at the end of compression are lower when richer mixtures are supplied. This explains at least in part the common practice of increasing the fuel supply when an automobile engine begins to knock.

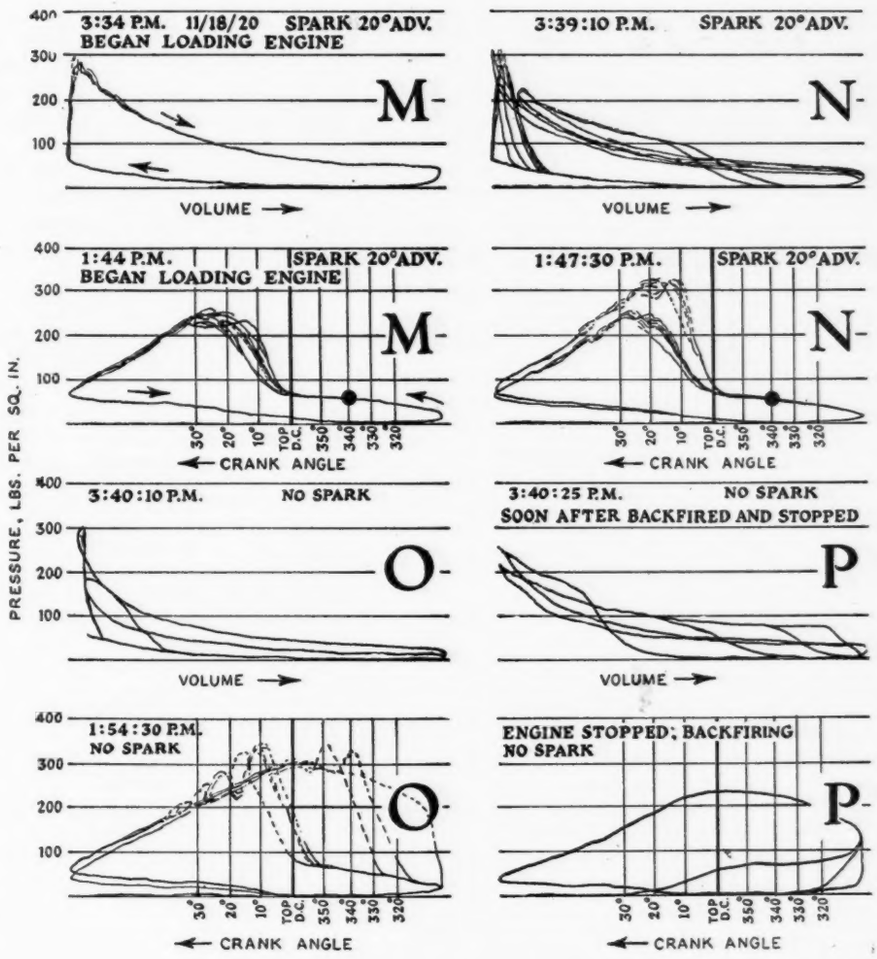


Fig. 4—Cards showing effect of heated spark plug electrode

The pressure rise shown on the indicator cards is closely connected with flame propagation, but the two are not identical. The pressure-time diagrams all indicate a time lag of about .007 to .01 sec. from the time of ignition until a perceptible indication of pressure rise due to combustion is recorded. Messrs. Woodbury, Lewis and Canfield* have shown that this delay of pressure rise is an actual fact and of about the same order of magnitude shown on the cards here given. What the pressures are in the burnt gas, behind the flame front, is, of course, unknown, but it is believed that they are much greater than in the unburnt gas ahead of the flame front.

The diagrams of Fig. 2, cards E, F, G and H, illustrate the effects of altering the time of ignition. The maximum indicated m.e.p. is obtained from the engine if the pressure rise occurs when the piston has started on the expansion stroke, not when the piston is stationary at dead center. That such timing of pressure rise may give better thermodynamic efficiency is shown by W. S. Walker.** The 80 deg. advance card (H) is similar to the card presented by S. W. Sparrow of the Bureau of Standards (S. A. E. Journal, October, 1920, page 397).

The elapsed time between the starting of pressure rise and the maximum pressure is about .007 to .01 sec. Approximating the maximum distance which the flame has to travel from its source and approximating the time from the beginning to the end of pressure rise as shown on the pressure-time diagrams, where 10 deg. of crank travel are equal to nearly .005 sec., it is found that the rate of travel of the pressure wave is about 50 to 70 ft. per sec. If it be assumed that the time from the start to completion of pressure rise is a measure of the time of combustion, then the velocity of combustion will be approximately 50 to 70 ft. per sec. for conditions of normal burning. These values are comparable with the velocities of flame propagation given by Hohneman and McKenzie (S. A. E. Journal, November, 1919). When detonation takes place, the velocities indicated by the rapid pressure rise appear to produce practically spontaneous ignition throughout the mass, this occurring, however, after a short period of apparently normal combustion.

Fig. 3 presents a series of cards, I, J, K and L, taken to show the effects of heating the engine. Card L is the normal card obtained with best spark advance and with the mixture leaned as much as possible, but still obtaining regular firing. The cooling water was shut off immediately before this card was taken and the engine was run at practically full load, continuing for about nine minutes. Although the jacket was full of water at the start, much of it must have boiled away during the run, as the heat was sufficient to start cracking the paint on the engine cylinder. Cards were taken at three-minute intervals during the nine-minute period. These cards

*The Nature of Flame Movement in a Closed Cylinder, *S. A. E. Journal*, March, 1921, page 209.
**Thermodynamic Cycles of Internal Combustion Engines, *Engineering, London*, Dec. 24, 1920, page 847.

show the changes in the process of combustion as the engine became hotter and hotter. The maximum pressure increased from normal of about 270 lb. per sq. in. to over 400 lb. per sq. in. The time of ignition was unchanged and the beginning of pressure rise (time lag from ignition) changes but little with engine temperature. But the location of maximum pressure shifts from 20 deg. after top center with cool engine to 10 deg. after center when very hot. Some of the highest pressures with the hot engine result from combustions which are nearly, if

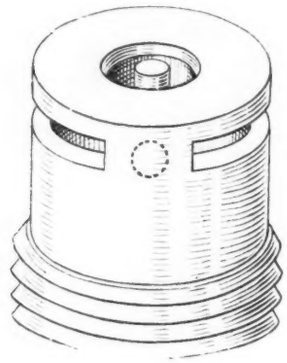


Fig. 6 — Plug used in securing autoignition

not actually, detonations. There is not a preignition shown on any of the cards of Fig. 3, although the engine knocked badly while the cards, J, K and L, were being taken. In fact, the engine knocked badly with either preignitions, or rapid combustions, or detonations.

In order to obtain preignition a piece of a broken spark plug porcelain was placed around the center electrode of a good plug, the engine was run under nearly full load, but with the usual rather cold jacket water. Typical cards for these conditions, M, N, O and P, are reproduced in Fig. 4. In this figure even the first card of the pressure-time series, taken immediately upon application of the load, indicates erratic combustion. Card N shows two distinct types of combustion, neither of which is detonation. For card O there was no electric ignition and the several diagrams show combustions ranging from normal to a preignition occurring during the compression stroke, but without any detonations. On card P the ignition was occurring earlier and earlier until it caused ignition of the incoming charge during the suction stroke, resulting in several back-fires through the carbureter, and finally stopping the engine.

Reviewing the cards of Fig. 4, it is interesting to note that the maximum pressure and the whole expansion line of the quicker combustions on pressure-time card N are above the slower ones. On the cards O and P the too early combustion is shown to be complete, and the subsequent expansion of the compressed burnt gases follows the normal expansion, except for leakage and cooling losses. This phenomenon is noted on the card shown by Sparrow in which after the pressure rise due to the early ignition is complete, the subsequent compression follows parallel to, and slightly above, the expansion.

The author has tentatively classified three types of combustion, each of which appears to be distinct. One of these types of combustion is the normal, relatively slow burning, shown as the lower set of combustion lines on pressure-time diagram N of Fig. 4. Another type is the faster burning shown by the upper, higher pressure combustion lines of the same diagram. Neither of these two types of combustion gave evidence of pinking, although the faster burning type did cause knocking. The third type of combustion has been classified as detonation, and is shown by a practically vertical pressure line on the pressure-time diagrams. Cards S and T of Fig. 5 show such instantaneous pressure rise and pinking was suspected, although the knocking was so bad that it was almost impossible to be sure of an extra pink. The combustion lines on card L, Fig. 3, seem to start out with the second (rapid) type of combustion, which eventually changes over into the detonation type near the end of the process, when high pressures are existing. Cards G and H, Fig. 2, with too early ignition, also exhibit this tendency. The pressure-volume diagram B of Fig. 1 shows one freak combustion which may have been a detonation, but so far it has not been possible to again secure this freak combustion under the same conditions of operation.

For the purpose of studying the temperature required for ignition a special form of hot wire ignition in which the igniting wire should also be a resistance thermometer in order to measure the ignition temperatures, was to have been employed, but it was not possible to use this in tests here recorded. A qualitative study was possible, however, by using some less effective form of preigniter than the broken porcelain. A spark plug was found which offered possibilities of being converted from a spark plug into a sort of hot tube. This plug is shown in Fig. 6. There was no electricity used for ignition in any of the cards, Q, R, S and T, of Fig. 5, all of them resulting from autoignition. It was found that the plug in its original form would run the engine after the igniting current was shut off. Card Q is the result of such operation. The plug in its original form never caused any preignition with normal spark, but it would become hot enough to give irregular ignitions after the electric spark was cut off, such as would have been produced by a spark timing of from 10 deg. retard to 10 deg. advance. For obtaining the next card, R, the plug was changed by drilling a small hole in each of the two bridges which connect the end plate to the shell of the plug, as shown by the dotted circle in Fig. 6, so that there was not so much metal to conduct the heat away from the end plate. This gave a more regular autoignition, producing cards corresponding to those obtained with a spark advance of about from 5 to 20 deg. For card S the heat conducting capacity of the bridges was again reduced so that

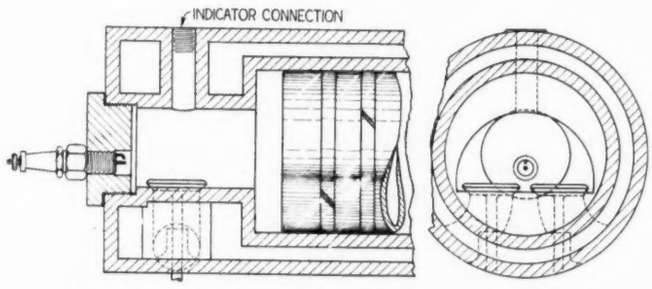


Fig. 7—Diagram of engine cylinder showing shape of combustion chamber and location of indicator

the plate would run hotter, and the timing of the autoignition was thus still further advanced. The character of the combustion was also changed to detonation, which in card T is so early as to be preignition as well as detonation. The engine knocked during the period when last two cards were taken.

The mere fact that a spark plug gives autoignition when the ignition is off does not necessarily mean that the charge is preigniting. The ordinary spark knock when climbing a hill or with a carbonized engine is probably due to the fact that the temperature of the gases inside the cylinder is relatively increased, a condition

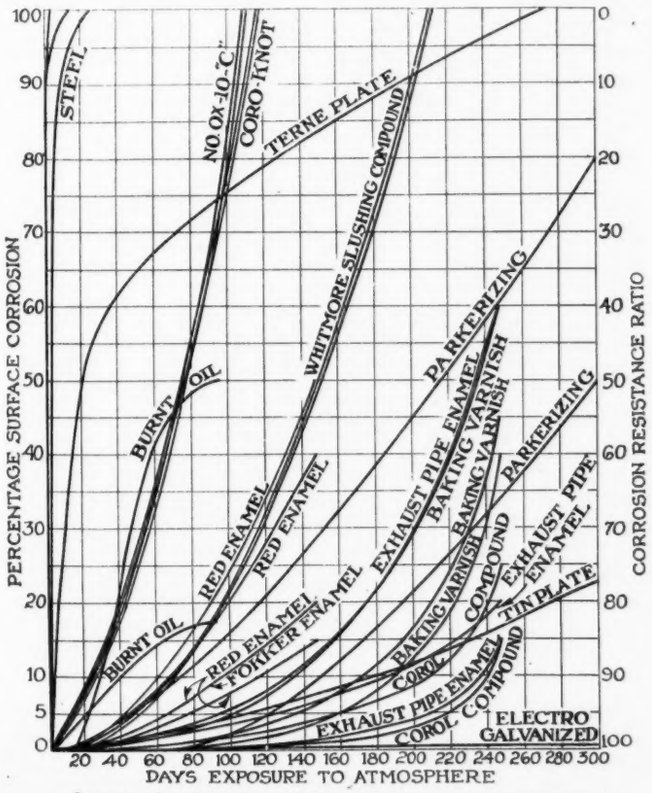
which was simulated in obtaining the cards shown in Fig. 3; resulting in some portion of the spark plug becoming hotter and perhaps causing the auto-ignition to come earlier in the stroke, as in Fig. 5. It is seen that such knocking can be stopped or reduced by reducing cylinder temperatures or otherwise securing a cooler spark plug. For example, more gasoline cools the cylinder as it uses more heat for its evaporation, and a retarded spark will also reduce temperatures by reducing the pressure at time of ignition. It is interesting to note that point ignition with the broken porcelain (Fig. 4) produced only one "near detonation," while ignition from the larger hot surface, when hot enough (cards S and T of Fig. 5) produces consistently repeated detonation.

It is suggested that ordinary combustion may be roughly divided into three types: (1) normal, (2) rapid, (3) detonation, of which the last two will cause knocking. The first two types are well exemplified by pressure-time diagram M, Fig. 4. When the "normal" explosions occurred, as shown by the lower combustion and expansion lines of this card, the engine did not knock. But it did knock when the combustion caused the higher pressure lines. It is peculiar that the time lag from the jumping of igniting spark till the beginning of pressure rise is practically the same for these two types of combustion.

Knocking can also be caused by too early ignition, irrespective of the type of combustion which follows, and preignition is followed by any one of the three types of combustion, or by a combination of any of the types. The experience of the author with this and other gasoline engines leads him to suspect that the spark plug is almost always the final agent in causing knocking, although the misbehavior of the plug is generally induced by some cause independent of the plug. The spark plug does not get too hot until the piston and cylinder temperatures are increased by some condition such as carbon deposits. The knocking can be stopped by cooling the plug. This statement is made, in spite of the fact that it is known that different fuels have different knocking characteristics, because it is believed that none of the automobile engines now built have too high a compression for the present day fuels (most of them have too low a compression for good thermal efficiency) provided suitable plugs, plug location and plug cooling are provided. The only drawback to proper cooling of the spark plugs is that sometimes so much oil gets by the pistons that the plugs have to run hot or they will rapidly foul.

Tests of Rust-Proofing Processes and Materials

THE Engineering Division of the Air Service at McCook Field has been conducting a series of tests on the effectiveness of various rust preventatives, especially with regard to their applicability to aircraft parts. Test specimens of sheet steel of uniform composition were cut to uniform size, 4 by 6 in., carefully cleaned to remove all rust, and thoroughly coated with the material to be tested. These were exposed out of doors for varying lengths of time. Periodic examinations were made to ascertain the time of the initial appearance of rust and the rate of corrosion progression. These values, plotted against the time in the accompanying chart, show how long each coating will keep the piece of steel from rusting.



Curves showing the relative effectiveness of various rust-proofing processes and materials

As a result of the tests the conclusion is reached that there is no known method by which complete protection is afforded. At best, all coatings are only inhibitive agents. An examination of the accompanying chart will show that these coatings have marked variations in protective properties. It will be noted that the two pieces of steel coated with Corol compound and the two coated with exhaust pipe enamel corroded the least. The Corol compound samples rusted 15 to 25 per cent during 247 days' exposure and the exhaust pipe enamel sample rusted 15 to 20 per cent during 247 days. Zink plating held up better than any other coating, corroding less than 1 per cent during 300 days.

Aeronautical Safety Code

A CONFERENCE was held recently in Washington to consider the development of an Aeronautical Safety Code, for which the Bureau of Standards and the Society of Automotive Engineers have been designated as the joint sponsors by the American Engineering Standards Committee. This conference was attended by representatives of the War, Navy and Post Office departments, the National Advisory Committee for Aeronautics, the National Safety Council, Manufacturers' Aircraft Association and the Insurance Underwriters, as well as representatives of the two sponsors and the American Engineering Standards Committee.

It was the sense of this conference that a safety code ought to be developed without delay and that a committee should at once be formed which would include representatives of all organizations interested in this subject as well as those which were present at the conference. Invitations have, consequently, been extended to other interested organizations.

Special Features in Cylinder Block Production

Cylinder block department producing 171 blocks per day contains special machinery from which exceptional production results are being obtained. A clamping device for holding blocks against locating face during profiling operation is one of the interesting features discussed.

By J. Edward Schipper

FROM the standpoint of completeness of modern machine tool equipment, there are probably no plants in the country which surpass that of the new engine factory at the Olds Motor Works. This concern is manufacturing its own engine for its small, eight-cylinder car. The engine plant is entirely new and is equipped throughout with the latest developments in special machinery for this work. Some of the machines are establishing new records for continuity of performance, and one of the great features of the work is the accuracy of manufacture, in spite of the use of high-speed production methods.

The cylinder blocks for the eight-cylinder motor are arranged and so designed that there is no difference between the left and right block; that is, a block may be put on either the left or right side of the crankcase and consequently the number of differently made parts for the engine is cut in two, as compared with eight-cylinder motors in which the left and right blocks differ. This result has been accomplished by establishing exact symmetry of design between the front and rear end water connections and, of course, exact similarity between both ends of the blocks in all other respects.

The present production rate averages about 19 blocks per hour per machine. The shop is on a 9-hr. day, giving 171 cylinder blocks per day, or a capacity of 85 engines. The average amount of metal cut from each cylinder block is 16 lb., as the rough casting weighs about 73½ lb. and the finished casting 57 lb. This gives a total of over 2700 lb. of metal cut per day in the cylinder block department. At the present time, with the plant operation being kept down to a maximum economy, one operator can, in a number of instances, take care of two or three machines. The result is that these cylinder blocks are being turned out at a labor cost which is astoundingly low, in spite of the fact that the operators are making good money on the job.

Roughing and Finishing Operation on One Machine

The first rough machining operation is handled on an Ingersoll rotary miller. The cylinder blocks are all inspected at the foundry and gaged in the usual manner to check up the amount of material at all machine surfaces. The Ingersoll rotary miller not only takes off the rough cut, but also takes the finish cut off in the same machine. The cut is taken from the top and bottom faces of the block, the rough cut taking off 3/32 of an inch and the finish cut 1/32 of an inch. The locating for this work is handled from a button located at the top of the water jacket and two locating pin bosses on the bottom flange. The clamp on the jig shown in Fig. 1, which illustrates both cuts taken on this operation, forces the block against the locating pin, sideways, and the endwise location is from the outside of Nos. 1 and 4 cylinder walls. One of the features of this big milling machine, which is practically in continuous operation, is its great rigidity. The machine holds six blocks at a time and the operator is loading the blocks on the machine at the opposite side from that illustrated in Fig. 1. The machine readily takes care of the schedule production of 19 per hr., and provides an accuracy in the finish cut which permits of a dimensional range from 7.750 to 7.752 in. That is, a total variation of .002 in. on the finish cut between the top and bottom faces of the cylinder.

Reaming and Drilling in Second Operation

The same operator who handles the first operation takes care of the second operation on these blocks. The second machine is a Foote-Burt drill with twelve spindles. This machine drills the bottom flange and two dowel holes, reaming the latter to locate the cylinder on the crankcase. The machine really performs two operations in doing this, as the reamers replace the drills for the two dowel holes, as shown in Fig. 2. The two drills which are replaced by reamers may be noted by the Magic quick-detachable chucks. The work is located by a V-block between the two center cylinder barrels and by two stops on the core side or inside of the cylinder block located at the end cylinders. This machine has the same capacity as the first milling operation; that is, 19 per hour, and, while it keeps the operator busy to run both these machines, he can readily do so by properly timing his movements.

The two dowel holes which align the cylinder with the crankcase, the drilling and reaming of which were described under the second operation, are utilized for locating practically all of the machine work which follows on the cylinder block. They are used for locating the third operation, which is done on a Foote-Burt machine, consisting of rough boring the four cylinders simultaneously. In this rough boring operation about ⅛ in. is taken off the cylinder bore, leaving about 1/32 in. on a side for finishing. This machine is capable of 19 per hour, to time it with the machines which precede it.

Another Ingersoll rotary miller mills both ends of the cylinder block at the rate of 20 per hour. This machine, like the machine described in the first operation, takes both a rough and finish cut off each end. The parts milled are the water opening pads on each end, the two ends being similar, as described, so that a block may be put on either the left or right side of the crankcase. The

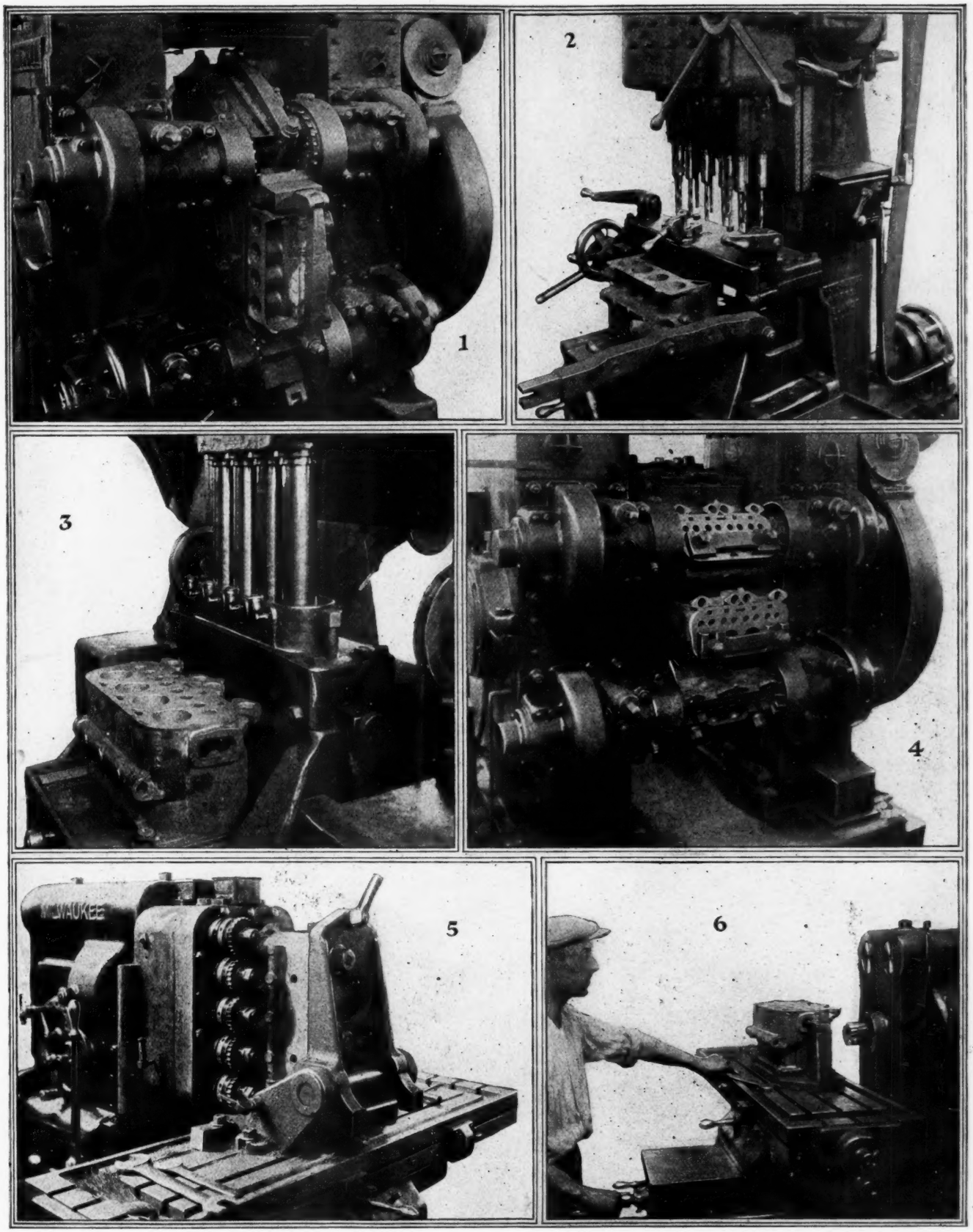


Fig. 1—Ingersoll continuous rotary miller which takes rough and finish cut from top and bottom face of block. Fig. 2—Foote-Burt multiple spindle drill with twelve spindles which mills bottom flange and drills and reams the two dowel holes for locating the crankcase on the cylinder block. These dowel holes are used for locating practically all of the machine work on the block. The dowel spindles may be noted by the Magic quick-detachable chuck used for changing over to the reamers for these holes. Fig. 3—Foote-Burt machine for rough boring cylinder block. This machine takes about ⅛ in. off the bore and operates at the rate of 20 blocks per hr. Fig. 4—Ingersoll rotary miller for milling both ends of the block. Miller has both rough and finish cutters. Fig. 5—Milwaukee 3B miller which mills the intake manifold flange on all cylinder blocks. Fig. 6—Milwaukee miller for milling eight bolt hole faces and spot facing two bolt hole faces on Olds blocks. Note location on these operations, which is from dowel holes in bottom of blocks, the work being secured by clamps in the water outlet hole

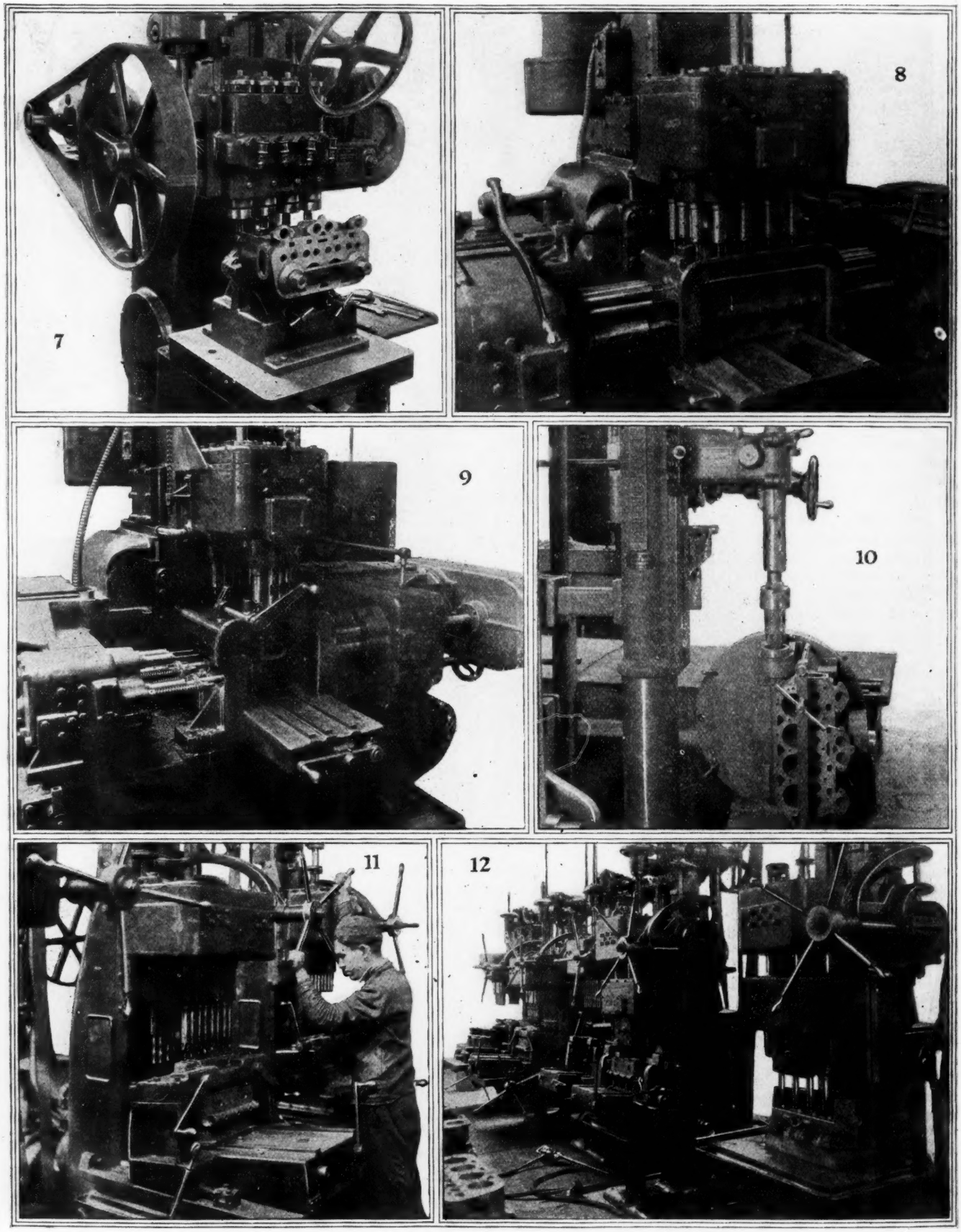


Fig. 7—Profiling machine made by Automatic Machinery Co. for profiling valve in section cover surface. Fig. 8—Three-way Foote-Burt drill, drilling 35 holes simultaneously, taking care of all the bolt holes on the top and both ends of the cylinder block. Fig. 9—Three-way Foote-Burt drill, drilling on front and rear sides of block and on top. Fig. 10—Cincinnati 24-in. radial which chamfers the gas intake manifold passage, counterbores and faces water circulation hole. Fig. 11—One of the Foote-Burt machines which works on the valve stem guide holes. There are a battery of these, one operator taking care of five machines, handling 75 blocks an hr. Fig. 12—View of the battery of Foote-Burt drills which is handled by one operator working on the valve stem guide holes and the valve opening chambers

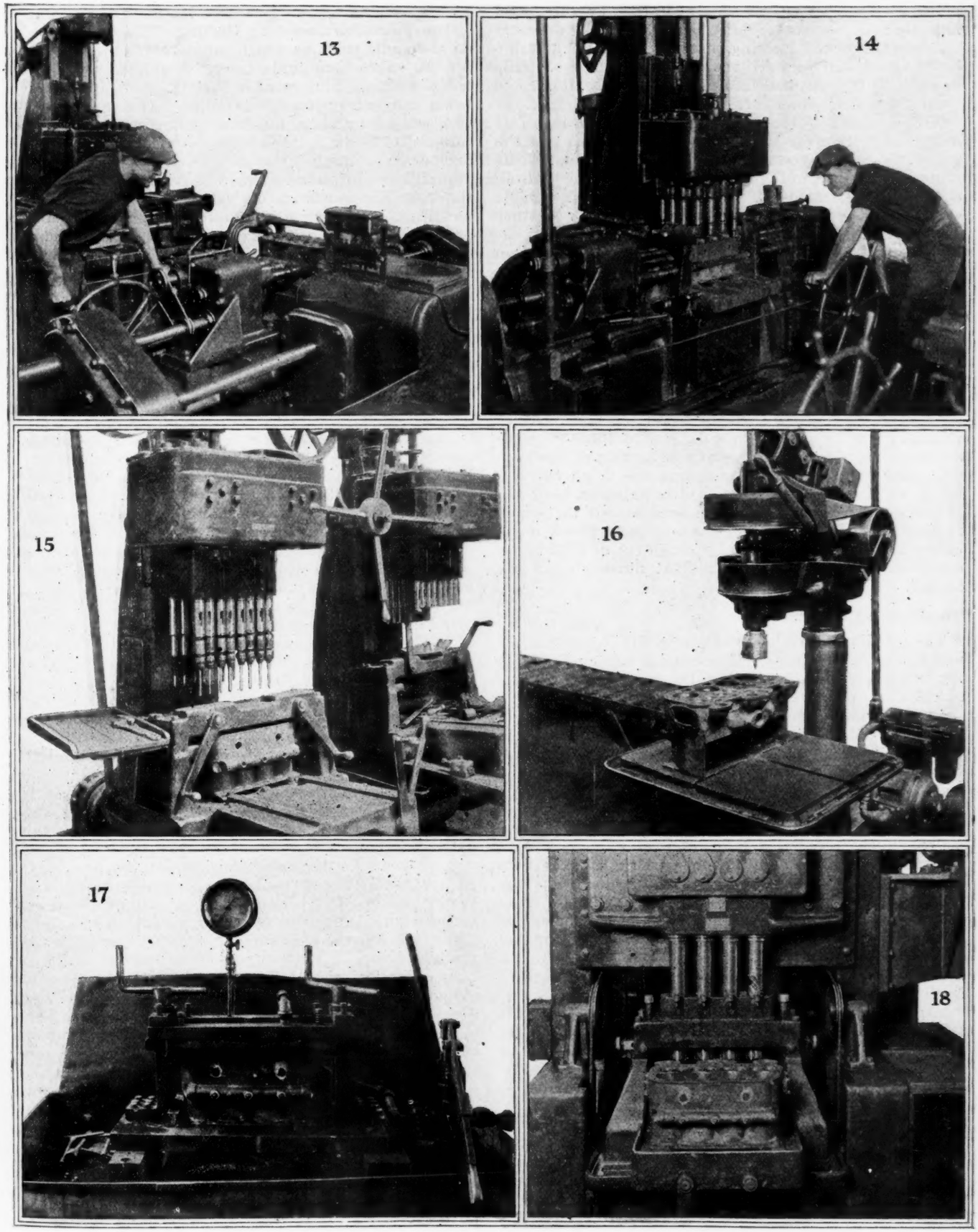


Fig. 13—Two-way Foote-Burt tapper which taps three water circulating plug holes on the rear side of the block, the gas intake manifold flange cap screw hole and two valve inspection cover stud holes simultaneously. Fig. 14—Three-way Foote-Burt tapper which taps 35 holes simultaneously in the Olds cylinder blocks. Fig. 15—Foote-Burt machine for semi-finish reaming the valve stem guide holes. Fig. 16—Garvin tapper which finish taps all the bolt holes for the cylinder head and exhaust manifold studs. Fig. 17—Fixture used for water testing the cylinder blocks. The water test is given at 60 lb. hydraulic pressure. Fig. 18—Foote-Burt machine for giving the cylinder blocks a semi-finish ream. One man runs three of these machines, which reams four cylinders bores at a time and takes off .064 in. of metal, leaving .020 in. for finish

cylinders are located for this operation by the dowel holes on the crankcase flange, and the blocks are held rigidly against the locating plate by means of a clamp bracket fastened between the two end cylinders. This bracket, which is bolted into place, is clearly illustrated in Fig. 4, which shows this operation.

A Milwaukee 3-B miller mills the intake manifold flange. Location for this is by the dowel pins and the work is secured by clamps in the water outlets. This milling machine, which is provided with five milling cutters, is illustrated in Fig. 5. The machine is capable of handling from 20 to 25 blocks per hour. Another Milwaukee miller with a single cutter mills eight bolt hole faces and spot faces two bolt holes. This single cutter miller is shown in Fig. 6. The block is located in the same way from the dowels on the bottom flange and is held against the bottom dowel plate by means of clamps in the water opening end. The miller is stationary, the table moves carrying the work to the cutters.

The following operation is a very interesting profiling job handled by an Automatic Machinery Co. profiler. This tool profiles the valve inspection cover surface and the operation is located from the dowel holes in the usual way. The profiling operation is around three sides of a rectangle and two machines of similar nature, one handling the rough cut and the second the finish cut, are used. Originally, it was intended to finish on both machines, but in order to hold the limit to .001 in., which is required on the finish cutter, it was found much easier on the tools to take off a rough cut of 7/32 in. on one machine and then take a light finish cut on the second.

The Profiling Operation

The profiling operation is shown in Fig. 7. As may be noticed on the illustration, the clamping scheme for holding the cylinder blocks against the locating face is the same as that employed on several other operations where the block is laid on its side for the work. This operation is extremely hard on any kind of a milling cutter, and this way of handling it is one of the most ingenious features in the entire shop. The Automatic machine which does this work is, of course, a special machine built for the operation, as are practically 100 per cent of the machines taking care of the manufacture of these cylinder blocks.

A three-way, 35-spindle Foote-Burt drill takes care of all the bolt holes on both ends of the blocks and the water circulation holes on the top of the cylinder. This machine also drills at the same time the bolt holes for the exhaust manifold on the top of the blocks and the cylinder head bolt holes. The block is located in an oven type of jig, this jig being so designed that the block is slid in on guides and then the dowel pins raised by manipulating the lever crank shown at the bottom left side of the jig. The operation is illustrated in Fig. 8, and is a particularly good example of three-way drilling on cylinder block work.

Another three-way Foote-Burt machine drills the Welch plug holes and counterbores them. These are on the rear side of the block. The same machine also drills three water circulation holes on the rear side and the water circulation holes in the head. It also takes care of the intake manifold bolt holes and the valve inspection cover plate bolt holes on the front side of the block. This gives a total of 19 holes drilled simultaneously.

The operation shown in Fig. 10 is on a Cincinnati 24-in. radial which chamfers the gas intake manifold passage and counterbores and faces the water circulation hole. This operation is handled in a tumbling jig and located from the dowel holes in the usual manner. The jig, of course, is indexing, as shown in the illustration.

The Foote-Burt machine illustrated in Fig. 11 is an eight-spindle machine which counterbores the core holes for the valve stem guide holes. A similar type of machine, which is illustrated in Fig. 12, drills and counterbores the valve stem guide holes. This machine has two sets of spindles, the block being moved back and forward to bring it into position for each set. The jig, of course, is indexing for this work and operates upon guides. The location is from the dowel holes similar to the other operations of this nature. The same operator handles the drilling and counterboring on this and a previous machine, as well as the reaming operation on the guide holes and valve opening chambers. He also handles the machine shown in Fig. 12, which counterbores for the valve head, and the other Foote-Burt machine, which faces the valve spring seat. With this series of five Foote-Burt machines all handled by one operator, one man is capable of taking care of the operations described, or 75 blocks per hour.

Few Hand Operations Required

Practically the only hand operation on the entire job is that of counterboring all of the cap screw studs and bolt holes in the block. This is done on an air drill. Following this there is a two-way Foote-Burt tapper, shown in Fig. 13, which taps three water circulation plug holes on the rear side of the cylinder block, the gas intake manifold flange cap screw holes and two valve inspection cover stud holes. The location of this work is from the dowel holes on the crankcase flange, as previously described.

For tapping the top and end holes there is a three-way Foote-Burt tapper with 35 spindles. This takes care of the holes on all except the bottom side of the cylinder, on which the dowel locating holes are again employed for positioning of the work. This operation is shown in Fig. 14.

Following the tapping of the holes on all three sides, as described, there is an assembly operation in which the valve guides and end cover plate are fitted, the water circulating holes are fitted with Welch plugs and pipe plugs are placed in the water circulation holes. The blocks are then given a semi-finish ream in the valve guide holes on a Foote-Burt machine and then the valve opening is finish reamed and the valve seat roughed out. The location for this work is done on the dowels, the jig being so arranged that the dowels are depressed while the block is put in position beneath the spindles. Quick-acting chucks allow for the replacement of spindles to take care of the different operations on this same machine.

In order to make certain that the bolt holes for the cylinder head are all exactly finished, these are given a finish tapping operation on a Garvin tapper. This operation is shown in Fig. 16. Following the tapping operation, the cylinder blocks are ready for the water test, this being handled on the fixture shown in Fig. 17. The water test is given under 60-lb. hydraulic pressure. This is sufficient to bring to light any defective blocks.

One man operates three Foote-Burt machines for semi-finish reaming the cylinder blocks. All four cylinder barrels are reamed simultaneously. On this reaming operation, which is shown in Fig. 18, .064 in. of metal is taken off. The location for the work is from the dowels on the bottom flange of the cylinder block. After this operation .020 in. of metal is left for finishing the cylinder bore. The cylinder bores are chamfered at the top and bottom on another Foote-Burt machine, as illustrated in Fig. 19. One man handles eight spindles similar to those shown in Fig. 20. This finish reaming operation

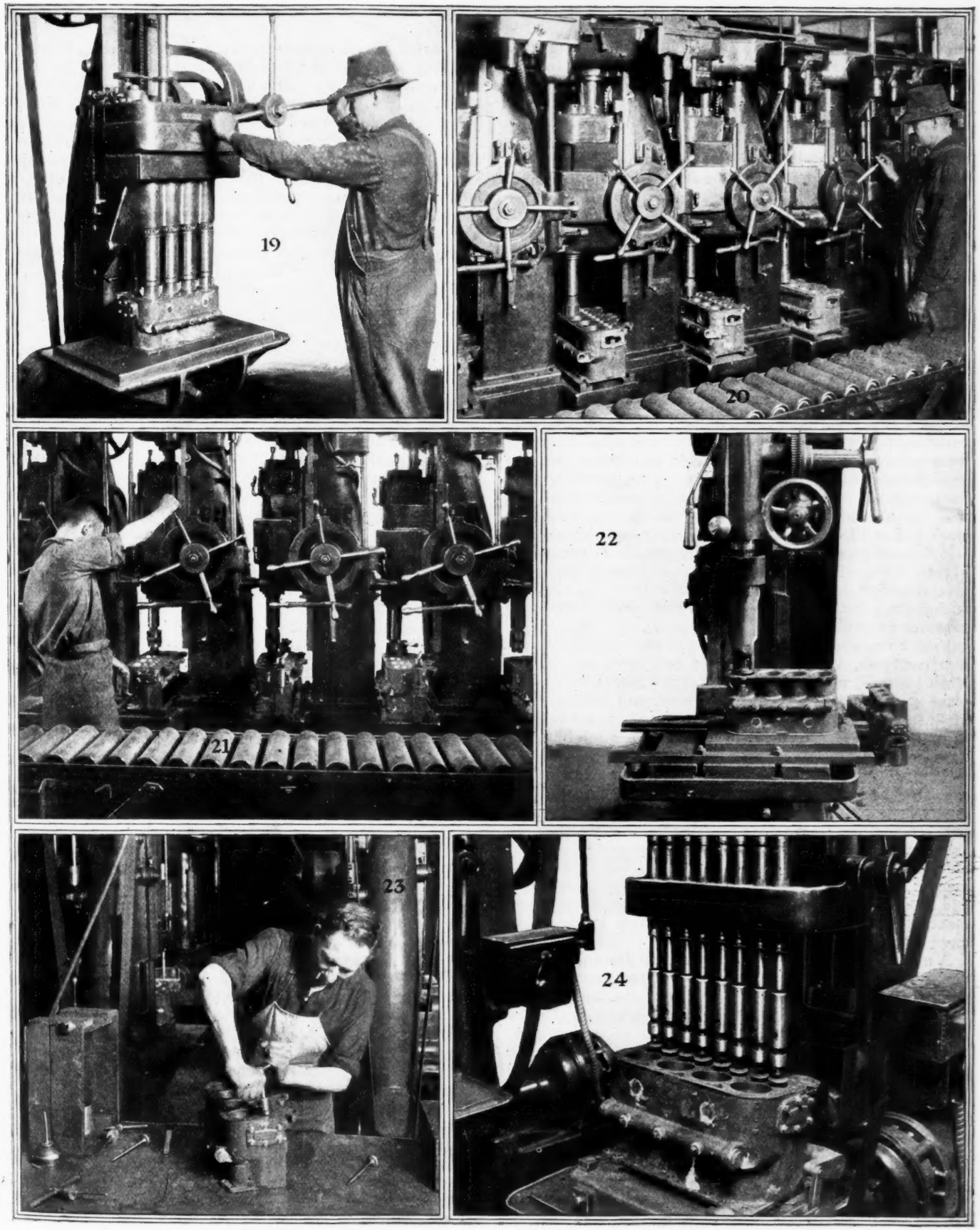


Fig. 19—Chamfering the top and bottom of cylinder barrel on a Foote-Burt machine. Fig. 20—Finish reaming the cylinder bores. One bore is reamed at a time on these machines, one operator taking care of eight spindles. Fig. 21—Rolling the cylinder bores to a finished surface. It requires 15 min. to a block to do this work. There is a taper of about 3 deg. on the rolls which is sufficient to run them through the blocks. This rolling operation puts a mirror finish on the cylinder block, slightly compressing the outer skin of the metal. Fig. 22—Baker single-spindle machine for chamfering the connecting rod clearance at the bottom of the cylinder barrel. Fig. 23—Finishing the valve seat by hand. Fig. 24—Grinding-in the valves on a special Foote-Burt valve grinding machine

takes out the .020 in. of metal left for finishing the cylinders and is held to a limit of plus or minus .001 in. The diameter allowed is 2.874 in. to 2.875 in.

The final finish on the cylinder bores is by rolling. This work is also done on single spindle machines, the rolling operation being done by a tool which resembles in some respects a roller bearing. The blocks are rolled to their finish surface, giving them an exceptionally smooth and mirror-like appearance. There is a slight taper of about 3 deg. on the rolls, which is sufficient to run them through the blocks and to give the desired feed. It takes about 15 min. to a block in handling this operation. Location is by the dowel holes in the usual way, with clamps on the top side of the blocks to hold it firmly against the bed plate on which the locating dowels are placed. This rolling operation is shown in Fig. 21.

A Baker single-spindle machine chamfers the connecting rod clearance at the bottom of the cylinder barrel, as shown in Fig. 22. The valve seats are then finished by hand, as illustrated in Fig. 23, and the valve guide holes are finish reamed on an air drill. The valves are ground in on a Foote-Burt special valve grinding machine, which gives the peculiar compound motion necessary for valve grinding. This machine spins the valves backward and forward through the arc of a circle and then lifts them and replaces them on the seat in the same way as the hand valve grinding operation, which is familiar to everyone. This operation concludes the manufacturing operations on the cylinder block.

Dealer Aids Make for Better Farm Power Merchandising

A FEW automobile manufacturers have sufficiently interested themselves in their dealers' merchandising methods to lay out model garage and salesroom plans and equipment. In the cases where this has been done, the dealers have usually been very glad to receive the suggestions and to act upon them insofar as possible. The manufacturer can be of very valuable assistance in this way because he places at the disposal of the dealer the work and abilities of trained engineering and service men.

Automobile merchandising, however, has reached a higher state of refinement and development than has tractor selling, and the tractor manufacturer who provides such service for his dealers has an even more fertile field in which to work.

Very complete plans for the layout and equipment of a power farmer dealer's store have been prepared by the Moline Plow Company and presented to their dealers. The plans are arranged to take care of a dealer handling a full Moline power line, and are designed to combine a maximum of efficiency and service potentialities with a minimum of expense.

A brief explanation accompanies the floor plan of the salesroom and service station. This description points out the reasons for the various features embodied in the layout. In addition to the floor plan, a complete list has been compiled of the machinery, tools and equipment which such a dealer should have. This equipment is listed and supplemented with charts and diagrams showing the advantages and necessities of the various units. A practical arrangement of the necessary machinery is shown by drawings and printed explanations.

A model tractor delivery truck has been designed for the power farming dealer, and drawings of this truck accompany the other material. In addition to the truck model, there is a specially designed service car which is also described by drawings.

Among other things that have been worked out by this manufacturer as an assistance to the dealer, is a stock record card and bin index especially designed for the power farming dealer; also a job card that is simple to fill out, but which constitutes an effective record.

A somewhat similar example of a farm power manufacturer recognizing the necessity for providing constructive aid to his dealers is an accounting system which has been worked out by the Avery Company for its dealers. This system is designed primarily to meet the needs of the dealer in tractors, threshers, farm implements, etc. The system is complete as regards records, but comparatively simple to operate and maintain. It will mean a distinct step in the direction of progress if this firm can "sell" the plan to a majority of its dealers.

It is not so much the details of these plans that are of interest, as the fact that tractor manufacturers are devoting such intensive effort to the development and refinement of the sales efforts of their dealers. Such dealer helps as this are bound to increase the effectiveness of the tractor and power farming salesmen and dealers and will go a long way toward bringing that industry, at least, out of the present general industrial slump. It is doubtful if many pages of "pep" talks could accomplish nearly as much as will this constructive effort.

British Tire Innovations

SEVERAL important variations in the policy of the British Dunlop Tyre Company are announced, as follows:

A range of straight-sided tires will be made in sizes from 32 x 3½ in. upward, with a new pattern non-skid tread. These straight-sided tires will have a cord fabric and a rim with a quick-detachable flange. All inner tubes are to be molded to the exact shape of the tire and will be jointless, both circumferentially and diametrically. Schrader valves in two sizes will be standard, steel-studded tires are abolished and canvas-cased covers will eventually disappear. Facilities will be provided for converting beaded-edge tire rims (clincher pattern) to the straight-sided type. A new detachable wire wheel, held by four or more studs and nuts, will be manufactured.

Beaded-edge covers will continue to be made for replacement purposes, and this will probably be necessary for many years to come, in view of the fact that practically all cars, except those of American manufacture, now in use in Great Britain have beaded-edge tires.

Although it has been suggested in some quarters that the use of straight-sided tires will eliminate the detachable wheel, this is not the view of the Dunlop company, who consider that interchangeable and quick-detachable wheels are almost as necessary with straight-sided tires and quick-detachable flange wheels as with beaded-edge tires; at all events, it is considered that the vast majority or motorists object to changing covers and tubes by the roadside, no matter how easily they may be fitted, if only because of the need for a certain amount of skill and muscular effort and the use of a pump. Detachable rims are not favored as an alternative.

This move of the Dunlop company in introducing a range of straight-sided tires will doubtless be followed sooner or later by other British tire firms, and there is good reason for believing that most of the cars at the next Olympia Show will have this type of tire.

The Trailer's Place in Transportation Merchandising

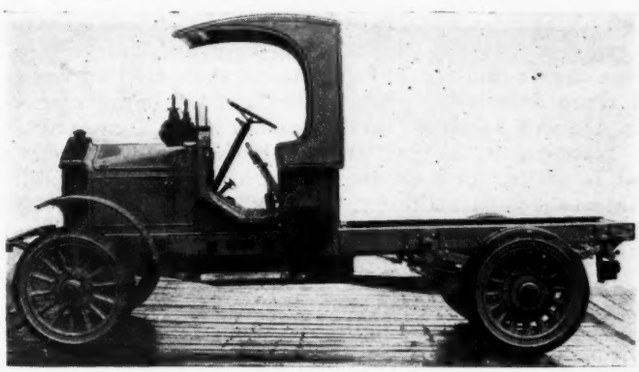
Part I

The attitude of truck manufacturers toward the trailer has changed in recent years. The problem of marketing the trailer, however, is not yet solved. The trailer may aid truck sales as an auxiliary hauling unit. This article and another to follow discuss trailer merchandising.

By H. W. Perry*

WHEN the motor truck members of the National Automobile Chamber of Commerce, at their annual meeting in June, adopted a recommendation that pintle hooks for drawing trailers be adopted as standard equipment for motor trucks, they took a step that was highly significant. It was evidence of an important change in the attitude of the truck manufacturers toward the trailer and indicative of their recognition that trailers are going to be used more and more with motor trucks.

A few years ago the leading truck companies were opposed to the use of trailers with their standard trucks, and about seven years ago the truck committee of the chamber put itself on record in a resolution opposing the use of trailers with standard trucks except under the most favorable conditions. Engineer members of the committee maintained that the hauling of a trailer slowed down the speed of the truck, increased the consumption of fuel due to running in low and intermediate gear, and caused additional wear of mechanism and tires, so that any gain in increased load hauled was offset by greater operating expense and depreciation. Experience up to that time, perhaps, justified these conclusions. Trucks were less efficient and sturdy then than now, and trailers had not even approached their present stage of development; moreover, the experience of users was exceedingly limited and did not furnish a sufficient basis for a conclusive finding. This early opposition persisted, however, up to very recently. It is still felt by some truck makers and by the large majority of truck dealers. The dealers' lack of interest in or active disparagement of trailers arise from different causes, which will be dealt with later.



Short wheelbase tractor for semi-trailers, with permanent cab and dual rear tires

As recently as eighteen months ago one of the largest trailer companies wrote to the chief engineers of the most prominent truck companies asking for a frank statement of their attitude toward trailers, and in each case received a reply that was more or less antagonistic toward trailer transportation. During the past year, however, the same company has had letters from practically all of the larger and many smaller truck companies requesting descriptive literature, operating cost data and leaflets for salesmen's handbooks. It has been evident for some time that a marked change in sentiment toward the trailer was developing, and the recent action of the N. A. C. C. confirms this publicly.

Growing Co-operation

A number of truck companies already attach pintle hooks as standard equipment on their regular models, and about a score build short wheelbase trucks as tractors for drawing semi-trailers and pole, pipe or logging trailers. From time to time a truck company goes to a trailer manufacturer for advice regarding the production of such a tractor model. In fact, a highly desirable and commendable spirit of co-operation is developing between these two branches of the industry. This is as it should be, because the truck and the trailer are both necessary units in economical highway transport and are interdependent; the trailer is useless without the truck and the motor truck is unsuited to certain kinds of work and is uneconomical under some hauling conditions without the trailer.

Formerly the truck interests were inclined to look upon the trailer as a competitor, believing that every sale of a trailer killed the sale of an additional truck, just as the railroads were of opinion that motor trucking cut into their traffic revenue. But as the railroads are beginning to see that motor trucks, by developing industry and commerce, are increasing the volume of the more profitable long-haul traffic, so the truck makers, by study of the situation, find that the trailer adapts the truck to new uses, makes it more profitable or economical for users and actually helps to create more sales.

The present depressed condition of general business is no doubt a powerful factor in drawing the favorable

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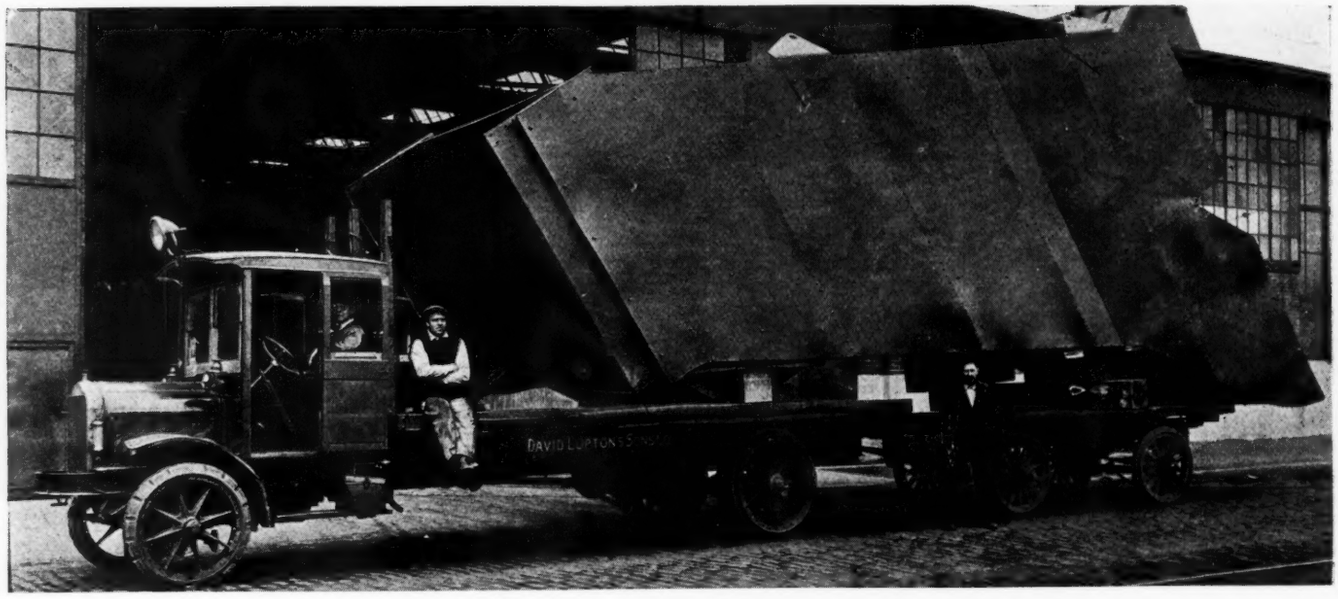


Hauling uptake for 7500 ton ship with truck and four-wheel trailer in Philadelphia

attention of the motor truck sales managers and transportation engineers to the possibilities of trailers in their various types. The necessity of doing business on a narrower margin of profit than for many years past compels reduction of expenses in every direction, including the cost of haulage. If, by an installation of trucks or tractors and a fleet of trailers, a municipality, a lumber company, a haulage contractor or other business can do its hauling cheaper than with horses, a sale can be created for both types of vehicles where there would be no sale for trucks alone. It happens frequently that trailer salesmen develop prospects for an installation of trailers and are asked to recommend a make of truck or tractor for drawing them. In such cases they usually call for the co-operation of some truck representative. In any event, they naturally try to turn the sale to some truck company that is not afraid to recommend the use of trailers with its trucks and that is willing to meet the customer and trailer man half way by furnishing a suitable trailer coupling and the proper gear reduction for the work. As one trailer sales manager puts it: "The attachment of a pintle hook hitch as standard equipment on the rear of the truck indicates to the buyer that that particular make of truck has drawbar pull and that the makers are selling TRANSPORTATION as well as motor trucks. The successful motor truck manufacturer is going to be the one who can convince the purchaser that his truck will pull a load, in addition to carrying one." Says another trailer man: "I believe I am justified in saying that from now on the truck manufacturer cannot sell trucks as easily and with as little consideration of cost of operation as he has in the past. In consequence, the trailer will justly be considered a necessary adjunct to the truck in order to make truck operation economical."

Special Haulage Problems

Trailer manufacturers have given more thought and study to special haulage problems than the truck manufacturers and their sales organizations. The trailer is, indeed, a specialized product developed in its several forms to meet unusual conditions that were not fully or satisfactorily met by the truck alone. The trailer sales manager and trailer engineer, therefore, have a broad understanding of highway transportation problems. They cannot entertain any prejudice against the truck and are always glad to co-operate with truck transportation engineers by supplying information and advice or suggestions. "Co-operation between the transportation engineers of the truck manufacturers and trailer manufacturers has been very good for the last two or three years and is constantly improving," says the general manager of a trailer company. "We have always felt that the truck engineers have co-operated with us, and we, of course, have with them. The ultimate gratifying results will no doubt be tangible very soon. And what I have said in regard to truck engineers and trailer engineers applies without modification to the relation of truck factory and trailer factory sales managers. There is a good deal of room for improvement along the lines of co-operation, but the improvement of the present time over what we had about four years ago is of great importance. I am looking into the very near future with a great deal of encouragement, visualizing a condition in which truck factory sales managers, district managers and even truck distributors will seek very close co-operation of our experts, and in a good many cases their advice, before they sell a complete truck installation. This view may be somewhat optimistic, but it is my conviction that, were it not for the fact that business is practically at a standstill in any line of endeavor, a great deal of this expected co-operation would right now be existing and working to the advantage of the ultimate buyer, who, after all, is the fellow that spends the money and must be served properly."

Sales Agencies a Problem

It is an open question to-day just how the trailer is going to dovetail into the truck business and by whom and how it is going to be marketed. Neither the truck makers nor the trailer makers have reached a satisfactory conclusion. The trailer industry is passing through much the same experience as the truck industry did in its earlier development, when it was found exceedingly difficult to effect sales through passenger car dealers and when exclusive truck agencies were unprofitable because of the limited truck market. In some respects the trailer business is analogous to the truck body business, but in the matter of selling it has to be conducted more nearly along the lines of the truck business, and is even more difficult.

The natural outlet for trailers should be through the

established truck dealers, who have all the facilities for conducting the business and have a good understanding of motor haulage, wide acquaintance with truck users, an intimate knowledge of the hauling requirements in their territory, and should be able to grasp readily the essentials of trailer transportation. Most of the trailer companies started their distribution on his assumption, and a large majority of trailer dealers to-day are established dealers in trucks. It has been found, however, that the truck dealer does not, as a rule, become an enthusiastic trailer man. In fact, he is less interested than the truck manufacturer. He finds that the problem of trailer transportation requires more study than truck transportation and that trailers are harder to sell because the trailer idea has to be sold to a prospect before the vehicle itself can be sold. The list price of trailers is much lower than on trucks, and, even with the same discount, the commission to dealers is comparatively small, so the dealer naturally prefers to make truck sales. Usually he has a considerable investment tied up in trucks and is anxious to turn his money over. The successful truck dealer and salesman are inclined to regard the trailer with some disdain and at best handle it only as an incidental side line. It has secondary place in their thoughts and, instead of taking a broad view of highway transportation and endeavoring to sell the equipment best suited to each particular job, they concentrate on the sale of trucks even in cases where the buyer would be benefited more by an installation of trailers.

The distributer under whom the dealer and salesman work contracts with the truck manufacturer for a stipulated number of trucks, usually for a period of one year. When times are good he cannot get enough machines to fill the demand and adjusts his sales and operating force to the volume of business to which the manufacturer limits him. On the other hand, when a reaction sets in and plenty of trucks are available but are harder to sell—a condition that has prevailed for the last twelve months—the distributor and the dealers make every effort toward moving the whole number of trucks for which they have contracted; consequently, the selling force has no time to give any attention to trailer sales. In such a situation they recommend trucks to purchasers who they know would be better served by trailers, but their problem is to move the trucks, and that is what they are doing. To make a success of trailer sales the dealer should put a salesman on the job exclusively. The passenger car dealers did not make a success of truck sales until they created a separate department for trucks and put truck salesmen on the job. And the truck salesmen had to be developed; it took a long time to convert a passenger car salesman into a good truck salesman, and it was often found easier and better to draw men from other lines of salesmanship instead.

Tank truck hauling four-wheel tank trailer, used for oil distribution. Trailer can be uncoupled and left at service station to be emptied while truck goes on to next delivery point

Trailer Selling Difficulties

The policy of marketing trailers through truck dealers meets another important difficulty. When the agency for a line of trailers is given to a truck dealer, the dealers in other makes of trucks in the same territory are very loath to send a customer for their trucks to a competing truck dealer to buy a trailer. Consequently, they actively discourage the idea of using a trailer and to this extent become trailer "knockers." The psychology is perfectly obvious. On the other hand, where trailers are handled independently by an exclusive trailer representative there is no such objection.

Changed business conditions that have been brought about in the last twelve months may alter the attitude of the dealer, who now finds that the market for trucks has been oversold in many directions and that most owners of a number of trucks have from 25 to 50 per cent of their machines standing idle. There is little chance of selling these owners more equipment until the volume of their business increases to the point where all the trucks are used to capacity. When such revival has occurred, it is almost certain that the owners will consider much more carefully than heretofore the initial investment and subsequent operating expenses of new equipment and will be very attentive to arguments in favor of trailers. The dealer or the manufacturer who can show how an installation of trucks or tractors and trailers will cut down the hauling cost will be most likely to get the new business and in many cases will be able to supplant whole fleets of old and inefficient trucks.

It is admitted in the trade that many trucks sold to date were badly sold; that they are not giving the best and most economical service because they are not suited to the kind of work they are doing. These will be the first to be replaced, and tractors with semi-trailers or pole, pipe or logging trailers will be substituted because they can handle double or triple the tonnage in one load, can haul material or objects of unusual length or awkward size and weight, or can save idle time during loading and unloading operations. In other cases smaller power units and medium-sized, four-wheel trailers will displace trucks of 5 to 7½ tons' capacity because of legal restrictions against excessive weight and because the trailer will take care of occasional overloads, while the smaller truck can handle the normal work more cheaply than the large truck operated with 50 per cent capacity loads.

Studying Transportation

Just now the field of sales possibilities has to be raked with a fine-toothed comb to find worth-while prospects. Then some very convincing facts must be presented to lead up to a sale. The most likely field of endeavor is among lines of business in which horses are still used largely and for which the motor truck is not well suited. These trades need painstaking study and analysis, which the truck dealer who has not made a thorough study of highway transportation in all its phases, and particularly of trailers, is hardly competent to make. In such cases the dealer calls on the truck factory for assistance and the factory transportation engineer is sent to make an investigation and recommendations as to the proper equipment for the work. If analysis indicates a need for trailers, a trailer man may be called on for co-operation before the sale is consummated. Thus the factory is necessarily closely tied up with many retail sales, even though it has a complete system of distribution through branches, distributors and dealers.

Demonstration Shows Tractors More Economical

The average cost per acre of preparing soil for sowing was 57.20 cents by horse outfits as against 16.72 cents for kerosene tractors—the best six tractors averaged 12.8 cents. Other results obtained are not very complete, while the oil consumption figures present special difficulties.

By David Beecroft

OFFICIAL results of the three-day tractor demonstration held at Fargo, N. D., June 28, 29 and 30, have been issued by the committee of the National Implement and Vehicle Association having the work in charge. The issuance of the report was delayed because the horse outfits which were competing with the tractors had not completed their work until some days after the tractors had finished theirs. The demonstration consisted of each tractor plowing and cultivating a 10-acre tract of land in the black, level, gumbo areas adjacent to Fargo, N. D. The temperature was very high, the thermometer registering over 100 deg. Fahr. during the day, which made it particularly hard on the twelve horse outfits, seven of which withdrew. Of the thirty-seven tractors that competed, one was disqualified due to breaking a gear.

The results are not very complete and show only the numbers of gallons of gasoline or kerosene needed in plowing and cultivating per acre, and also the time required to do the work. The figures are not given for individual tractors, but only averages for all tractors. There were thirty-six tractors that completed the demonstration, and of these twenty-five burned kerosene and eleven burned gasoline.

Fuel Consumption

The average fuel consumption for the twenty-five that burned kerosene in plowing 10 acres each amounted to 3.01 gal. per acre. Kerosene was worth 11.8 cents per gallon at Fargo, so that the kerosene cost per acre was 35.518 cents. To this should be added gasoline which was used by them in starting. Approximately .12 gal. per acre of gasoline was used, which, at a cost of 23.1 cents per gallon, gives a cost per acre of 2.772 cents for gasoline. Adding this to the kerosene cost gives an average of 38.29 cents per acre for fuel for the twenty-five kerosene-burning tractors.

The cost figures for the eleven tractors which burned gasoline showed that they used 2.77 gal. per acre in plowing, which, at 23.1 cents per gallon, gave a total cost of 63.987 cents per acre. It will be noted that the average amount of gasoline was less than kerosene, but the cost of gasoline being approximately double that of kerosene made the cost per acre approximately double.

It must be borne in mind that these figures represent average fuel consumption of the twenty-five kerosene-burning tractors in one case, and the eleven gasoline-burning tractors in another case. Two other sets of averages were given in the report, as follows:

A—The average of all of the tractors constituting the better half of the group, those that would be above the average figures already quoted.

B—The average of the six tractors giving the lowest fuel performance.

The figures for the A group show considerable improvement over the average of all the tractors, in that the best half averaged 2.87 gal., compared with 3.01 for the first. This gives a fuel cost per acre of 36.24 cents, as compared with 38.29 cents per acre in the general average.

When the B group is considered—that is, the fuel economy per acre of the six best performing tractors—greatly improved results are shown, the average kerosene fuel consumption being 2.51 gal. per acre, instead of 3.01 gal. per acre for the entire group. The fuel cost per acre plowing by the six best performers was 30.56 cents per acre, with kerosene used as a fuel and gasoline used for starting purposes.

The three averages summarized as follows:

	Cost per acre
No. 1—General average (kerosene)	38.29 cents
No. 1—General average (gasoline)	63.98 "
No. 2—Best half average	36.24 "
No. 3—Best six average	30.56 "

Oil Consumption

Figures on lubricating oil consumption were given, but AUTOMOTIVE INDUSTRIES greatly doubts the value of such figures, due to the difficulty of getting figures on engine oil consumption that admit of comparison with engines where different lubricating systems are used. There is also the difficulty of accurately measuring oil consumption over such a short period, while the problem of crankcase dilution is a factor that should be considered in connection with lubrication consumption report.

After each tractor had plowed its 10 acres it was required to cultivate and seed by means of disk harrows, spike-tooth harrows, seed drills and in some cases other farm equipment. This work was done immediately after the plowing was completed and a record was kept of the fuel used and the length of time required. For the four divisions given above the cost figures for fuel are:

	Cost per acre
No. 1—General average (kerosene)	16.92 cents
No. 1—General average (gasoline)	29.56 "
No. 2—Best half average	16.11 "
No. 3—Best six average	12.60 "

This summary shows that the best six had a fuel consumption at least 25 per cent better than the average of the twenty-five in No. 1 classification using kerosene.

The committee in charge endeavored to give some report on the time required in doing the work, and the

figures were given out in the form of man-hours per acre, that being an effort to arrive at the man-cost plowing per acre as compared with plowing per acre by horses. In the four classifications the number of man-hours per acre are given in the following tabulation, and the man-cost per acre reckoned on a wage of 40 cents per hour is also given:

	Man-hours per acre, plowing	Man cost per acre, plowing, cents
No. 1—General average (kerosene)	.94	37.60
No. 1—General average (gasoline)	.95	38.00
No. 2—Best half average	.95	38.00
No. 3—Best six average	.84	33.60

On a basis of a 10-hour day this puts the workman's wages at $4 per diem.

Owing to the information not being given out as to the number of plows drawn by the six best tractors in the No. 3 group, it is not possible to arrive at conclusions as to whether the six best were machines pulling three, four, six or eight plows. The only figures are averages.

The report gives some figures on the five horse outfits, each of which plowed and cultivated 10 acres. Unfortunately, the figures are not given separately for plowing and cultivating, so that no comparisons can be drawn with the tractor classifications. They show the amount of hay and oats needed by each horse outfit and the number of man-hours for plowing and for seeding.

The horse outfits required 2.64 man-hours per acre, which, at 40 cents per hour, gives $1.056 man-cost per acre, as compared with 33.6 cents by the best six tractors.

The cost of preparing the soil for sowing the seed and seeding, as based on a man-hour record, and labor at 40 cents per hour, shows that the cost per man-hour for the six best tractors is 12.80 cents, as compared with 57.20 cents by horse. Each horse outfit consisted of six horses. The tabulation for the different classifications is:

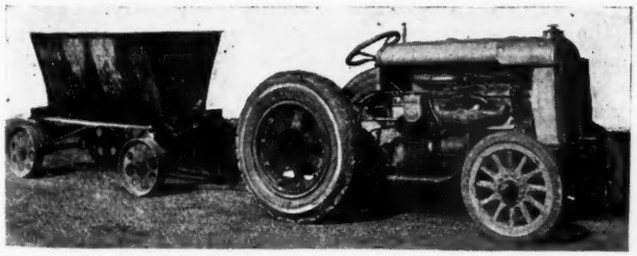
	Man hours per acre	Cost per acre
No. 1—General average (kerosene)	.418	16.72 cents
No. 1—General average (gasoline)	.43	17.20 "
No. 2—Best half average	.42	16.80 "
No. 3—Best six average	.32	12.80 "
Horse Outfit average	1.43	57.20 "

Removal of Glue Stains

ACCORDING to the Forest Products Laboratory, casein and vegetable glues containing caustic soda produce stains on certain kinds of wood, notably the oaks, maple, cherry, elm, ash, birch and beech. Some glues stain the wood more than others, and those that contain the most alkali are likely to be most injurious. The staining is due to the action of the alkali in the glue on the tannins and other constituents of the wood, whereby a substance related to ink is formed. No means have yet been found of preventing this chemical action. Precautions can be taken which will keep the discoloration from the finished surfaces.

The most trouble with glue stain in woodworking is caused by the penetration of the glue solution through thin face veneers. This seepage is very likely to occur if the veneer is less than 1/20 in. thick and somewhat porous. The consistency of a glue in part determines whether it will be squeezed through the wood or not. It is quite obvious that under similar conditions a thin glue will penetrate farther than a thick glue. For this reason the quantity of water that is added to a glue might be diminished and "fillers" added when staining is feared. The amount of pressure exerted by the panels in the press is also a factor, but it would not be advisable to reduce the pressure in order to check the flow of the glue.

If a panel is dried promptly, the caustic-soda solution will have difficulty in coming to the surface. Rapid drying can be brought about by removing the panels from the press as soon as it is safe to do so, and placing them on stickers. The amount of staining can also be decreased somewhat by placing a caul or some other flat object between adjacent panels in the press.



Fordson tractor equipped with pneumatic tires used for hauling various equipment at one of the plants of the U. S. Rubber Co.

Casein and vegetable glue stains can be almost entirely removed by sponging the stained surface with an oxalic-acid solution, prepared by dissolving one ounce of oxalic-acid crystals in about twelve ounces of water. Still better results can sometimes be obtained by moistening the wood first with a sodium-sulphite solution made up in the same concentration as the oxalic acid. In this way very stubborn stains can be almost obliterated.

Small Motorcycle Performance

THE Tourist Trophy races constitute the major motorcycle event of the year in Great Britain. The features necessary in a machine to win one of these races include acceleration, ease of control, efficient braking, reliability and, last of all, speed. There are two classes, Junior and Senior, and the races are run over a typical road course. The Junior machines are limited to 350 c.c. and the Seniors to 500 c.c.

This year the Senior race was won by a Junior 350 c.c. machine running in the Senior class. Commenting upon the significance of this result, the *Motorcycle* says editorially:

"Many consider that the 500 c.c. machine is at a disadvantage on such a tortuous course, and that the race is not won on sheer speed on the level, but upon corner work. Be that as it may, the winner was in no sense a reckless rider, and, possessed of a mount which held the road magnificently, he was able to prove what we suggested after last year's Senior race, viz., that the present limit of 500 c.c. might reasonably be cut down to 350 c.c., Junior machines to 250 c.c., and genuine lightweights to 200 c.c. without loss of speed.

"After all, as we have long argued, if we gain anything by the T. T. it is in efficiency from a given capacity, and instead of piling on weight to cope with the increased speed attainable, and producing heavy solo machines (some scaled over 300 lb.), the natural course seems to be gradually to continue the restriction of engine "c.c.," and so gain the advantage of greater engine efficiency by reducing weight. Many question whether the ideal solo mount is a machine of 80-m.p.h. caliber scaling 300 lb.; yet that was a fairly common specification of Senior machines. Speed is only of real value when opportunities for its employment are available."

The Value of Foreign Trade as Hoover Sees It

In times when production capacity is greater than domestic needs, export sales should be measured by the buying power so given to those persons employed to produce these goods. Some workers are probably saved from poverty. Automotive export notes.

SOME highly interesting remarks on the general subject of export trade are found in an address by Herbert Hoover, Secretary of Commerce, at the National Shoe and Leather Exposition and Style Show at Boston. A few paragraphs from this address are quoted here:

There is a feeling of some uneasiness and even of pessimism regarding the future of our foreign trade in which I do not participate.

Our exports and imports during the last few months have dropped nearly 50 per cent in value from the high-water mark of a year ago. Some of this decrease is due to the fall in prices relatively more than volume; some of it to the temporary world depression, and some of it lies deeper.

In these times of troubled minds we find much conflict of opinion as to the situation and its remedies. Some extreme groups insist that inasmuch as our exports comprise but 10 per cent of our total production, therefore our foreign trade bears only this ratio to our economic life, and that consequently our true course is to forget it and to devote ourselves to healing our internal economic wounds. Other extreme groups consider that for our internal situation the only remedy is restoration of our export trade and they would undertake desperate measures to accomplish it. In either case we must not allow the present extreme industrial depression to obscure our view. We have passed through several depressions since the Civil War, and we have already turned the corner of this one.

The importance of our foreign trade requires but little defense. I may say, in passing, that our whole standard of living greatly depends upon our imports, and that our exports are the great balance wheel for our production. Exports are vital to the stabilization of our industries, of price levels, of wages and of employment. While our exports do cover but a small per cent of our total production, on the other hand they do comprise a large percentage of the production of certain industries. For instance, we generally export 20 per cent of our wheat, 60 per cent of our cotton, 75 per cent of our copper, not to mention others. **Unless we find a market for the surplus production of our great industries, we shall continue to keep some twenty-five millions of our people in reduced buying power.** We might even drive them into poverty—during the many years that would be required to shift the whole basis of our internal production. Nor does a nation become rich by its exports alone—but by its trade.

While many of the causes of the present depression lie within our own borders, yet there may be no recovery from these hard times for many years to come if we neglect our economic relations abroad. Even if we lower our vision of civilization in this crisis solely to our own selfish economic interest, we are yet mightily concerned in the recuperation of the entire world. **The hard times that knock at every cottage door to-day came from Europe. No tariffs, no embargoes, no navies, no armies can ever defend us from these invasions.**

Our sole defense is the prosperity of our neighbors and our own commercial skill. The recovery of our foreign trade can march only in company with the welfare and prosperity of our customers.

As to our manufactures containing a large element of labor cost, in which we do not enjoy special advantages, we must look out and take measures of our own. We can no doubt devise tariff measures that will protect our domestic market. But if we are to hold to our foreign markets in this vast group of our manufactures, and thus to keep our people employed, we have several things to attend to.

> **Fundamentally, we must get our production costs down. That lies only along the road of increased efficiency in our whole industrial machine. It means a willingness of our working people to put forth every effort that is in them consistent with health, proper family life and good citizenship. The surest road to a continued high wage, and the surest safeguard against unemployment is to remove every restriction on effort. This must extend from our mines to the railways, to the factories, to the wharf and to the ship. It means smaller margins of profit.**

It means that ultimately we must have much lower transportation rates. It means we must have better organized marketing machinery abroad under Americans themselves. It means the establishment of adequate short-time credit machinery and much more care in foreign credit risks than our merchants have shown in the last twelve months. It means elimination of the great wastes in industry. For instance, in the Atlantic seaboard area alone, by the development of these great water powers and through economies by electrification generally, we could profitably save 30,000,000 tons of coal per annum if we had the courage to go at it. It means the Government must remove as quickly as possible those unnecessary domestic burdens upon commerce to which the Government is a party by the reorganization of our tax system, the settlement of the tariff question, the reduction in Government expenditure through the reorganization of the Federal Government, through reduction of armament and through reduction of Shipping Board losses and by the settlement by the Government of the outstanding claims of our railways.

It means we must cease trying to drive American ship owners off the sea with tax-paid shipping losses. We must carefully determine what particular trade routes

we will maintain in development of our commerce over a period of years, and let our merchants know them. It means the Government must provide such information to commerce and industry, from both at home and abroad, as will enlarge its judgment. It means we must extend scientific research into the problems of waste, the perfection of processes, the simplification of methods that are beyond the ability of one manufacturer acting alone, and we must co-operate with industry to perfect these things. I am confident we can hold our markets, our higher standards of living and of wage if we will all put our backs into it.

In summary, on the production and marketing side of our commerce, we can say that our food exports should remain on a greatly enlarged scale; that the demand for our raw materials should slowly increase toward pre-war amounts; that in respect to our manufactures we should be able to hold special fields of repetitive production and ingenuity; that we will need to make a fight to hold the markets for manufactured goods where we come more directly into competition with the European manufacturer, but that we can do it if we will work and apply our brains to it. On the financial side of our situation, I do not believe our world credit situation is at all so insurmountable or that it requires extraordinary solutions.

As to Paraguay

Steady growth in the use of automobiles in Paraguay, one of those interior countries of Latin America which so often is seldom considered by export managers as offering an outlet for sales, is shown in a report to the Bureau of Foreign and Domestic Commerce by Vice-Consul George E. Seltzer at Asuncion. The mayors of the five most important cities in Paraguay have given the number of cars in their localities as of Jan. 31, 1921. The reports are Asuncion, 384; Villarica, 12; Concepcion, 40; Pilar, 4, and Encarnacion, none. It was estimated that at least 95 per cent of these are of American make.

If You Sell in Britain

A man who has long been interested in the merchandising of cars in Great Britain recently wrote to AUTOMOTIVE INDUSTRIES:

If it was my duty to instruct the American exporter of cars for the British and Colonial markets I would draw up a specification of requirements on these lines—bearing in mind that a compromise would be necessary to combine the requirements for two markets—domestic and foreign—which must of necessity be dissimilar and varying.

Gross weight with two- or four-seater body not to exceed 1500 lb.

Starter optional, but provided for.

Magneto ignition optional, but available also as dual with standard accumulator and coil set; variable timing.

European type of carbureter. Auto-vac or gravity feed optional.

Engine a "four" or "six," preferably the latter, en-bloc cylinders—not exceeding 2¾ in. x 5 in., with loose head, overhead valves with all inclosed valve-gear, light pistons, gravity cooling with provision for a circulator or impeller (not a centrifugal pump) for Colonial use, simple pump-assisted lubrication with more efficient details, and able to displace a large volume of oil, if required, for hot colonies; also a three-bearing crankshaft.

Three-point suspension and one-piece construction of engine, clutch and gear box, with ready access to the clutch for independent removal — this would entail a longer and half-open clutch pan and housing than with present unit construction.

A four-speed and reverse gear and 4½-to-1 axle gear (spiral-bevel) ratio, axle gear removable from the back of the casing. Axle gear ratio of present American popular cars is a trifle too long.

Pressed metal axle casing and torque tube, no reliance on springs for drive thrust or torque.

No internal or sub-frame to chassis frame.

Double rear hub, side-by-side interchangeable brakes.

Better steering than is usual with cheaper American cars.

Better grade body work as regards doors' fit and the depth of squabbing and seating, and details at large, including lamps. These and other details should be copied from a standard British light car, but with more leg room than average of British and French light cars.

Alternative model with two-, three-seater body—very popular among doctors and travelers, but must be roomy and well ventilated without being draughty. Latter remark applies also to open touring body.

Better grade radiators of cellular or film type than is sent here on cheaper cars.

Suspension quarter-elliptical throughout.

Gross or retail price in Britain not to exceed £250, or $1250, at normal rate of exchange.

Commencing April 9, the Polish Government permitted the importation of passenger cars, upon which the customs duty is 13,500 Polish marks per 100 kilos (220 lb.) of weight. This report was made to the Bureau of Foreign and Domestic Commerce by Trade Commissioner Van Norman at Warsaw. Motor trucks, which have not been excluded, now take a customs duty of 300 Polish marks per 100 kilos.

Market in Algeria

A correspondent of the London Times Trade Supplement has drawn attention to the good prospects for motor vehicles in Algeria. He gives the following figures in support of his statement:

Number of vehicles recorded as actually in use at the end of March last 10,553, of which 8764 were cars, 1317 trucks, 310 omnibuses and 162 motorcycles. At the end of 1919 the total was only 8000.

In normal times Tunis and Morocco constitute good markets for motor vehicles, though they do not reach the importance of the Algerian market. About 2000 motor vehicles are at present in operation in Tunis, of which 1760 are cars and 165 lorries. Generally speaking, strong and simple machines are preferred of 8 to 15 hp. with four to five seats. Prices should be moderate.

It has to be pointed out that whilst French cars enter Tunis free of duty, foreign makes are heavily taxed. Consequently most of the cars in use are French. Next come American, Italian and British.

French Morocco is a market for 6000-7000 lb. trucks, which, however, must have large fuel tanks, and be sent out well supplied with spare parts; their mechanism must be simple and easily accessible, as, in most cases owners must carry out their own repairs, and the radiator should have a large cooling surface on account of the heat in the summer time. Particular attention should be paid to strengthening all parts likely to be affected by indifferent road surface.

One hundred fifty-four thousand seven hundred automobiles enter and leave New York every day.

Four hundred twenty thousand passengers arrive in New York by automobile daily.

Remarkable Hangar Built for the Navy's Two Dirigibles

This building, with doors 170 by 264 ft. has some amazing features and is expected to serve as a model for docks for this sort of aerial conveyance. The measurements are: Length, 803 ft.; width, 264 ft.; height, 190 ft.

THE U. S. Navy Airship Hangar at Lakehurst, N. J.—America's first great terminal for the giant airships which may be a common sight in this country within the next few years—is practically completed. It is the largest structure of its kind on earth, being 803 ft. long, 264 ft. wide and 190 ft. high. Set down in a city it would occupy three blocks. The doors at each end are more than 170 ft. high and are 264 ft. wide. A sixteen-story skyscraper could be pushed into the shed through the space disclosed by the doors when they are opened.

Rising from the Jersey flats, it presents an amazing spectacle to one on the ground. Observation platforms on the roof command a view of the Atlantic, 7 miles distant. In another direction, equally as far away, the fashionable summer resort of Lakewood can be seen clearly; while in the near vicinity the last of the 1400 acre reservation is being cleared to provide workshops, shelter and transport facilities for the 800 enlisted men and 500 civilian employees who will be required to man the hangar and care for the two great airships which it will shelter.

The airships are the Z.R.-1 and Z.R.-2, the former being built at League Island Navy Yard, Philadelphia, and the Z.R.-2, now undergoing trials in England. The hangar will be completed before the scheduled trans-Atlantic flight of the Z.R.-2 in August. The airships are each 700 ft. long and 85 ft. in diameter. They are as large as the great ocean liners. Capt. W. A. Moffett, Chief of Naval Aviation, an ardent believer in the future of aerial transport, is of the opinion that commercial aviation will receive considerable impetus from the operation of the Navy dirigibles and their terminal. Accordingly, all preparations at the Lakehurst hangar are with a view toward establishing facilities and conducting experiments which will aid commercial transport, and at the same time keep the public informed concerning the progress in the development of lighter-than-air craft.

In addition to the great hangar, the Navy plans to erect a mooring mast to which the big airships may be tied outside of other shelter. The mast will be so constructed that the giant ships will be moored bow on to the mast, and will swing in the direction of the wind, thus avoiding the dangerous forces exerted by high winds. The Navy contemplates also the erection of other mooring masts throughout the country, such as St. Louis, Kansas City, Chicago, Denver, San Francisco, Seattle, New Orleans, Atlanta, Columbus, Ohio, and San Diego, Cal. These will be based on results of experiments with the Lakehurst mast.

To-day the hangar is so nearly completed that Captain Moffett has assigned Comm. R. D. Weyerbacher, of the Bureau of Construction and Repair, and lighter-than-air expert for the Navy, to supervise preparations for receiving the Z.R.-2.

The doors of the hangar constitute the chief engineering problem. Each leaf is made up of 800 tons of steel and corrugated asbestos. There are two leaves on each end, opened by sliding parallel with the front of the shed. Only they do not slide. Instead, they are supported on concrete trucks, which in turn rest on wheels the size of those on a freight car. Similar trucks set out from the doors and parallel to them support huge steel girders braced against the top steel framework on the doors, and acting as braces against heavy winds which sweep through the great shed with the ferocity of a gale. High winds would blow the doors apart if they were not properly braced, engineers assert.

Like the doors, the entire siding of the shed is corrugated asbestos, arranged in strips alternating between gray and two shades of brown, so camouflaging the shed as to break up its outlines and making it impossible for a hostile observer to identify it from the air.

Besides the railroad running lengthwise through the hangar, there are three trolley slots which are known as docking rails. The dirigible about to enter the hangar will be fastened by cable to these rails, which extend on a 1500-ft. runway at either end. Anchored to the rails, it will be a simple matter to guide the leviathans of the air into their berths.

Under the roof, among the network of steel rafters, five monorail cranes support movable platforms which enable the workmen to repair the airship after it is docked. The rafters are so far from the floor that a human voice cannot be heard. Workmen become mere specks as they move along the "cat-walks" which criss-cross the arches at dizzy heights. More than 16,000,000 lb. of steel have been used in the framework.

Supporting this are series of nine trusses forming arches. They are the largest of their kind, and are arranged in pairs. These iron girders are 172 ft. long.

The entire hangar is as fireproof as possible. The concrete floor is covered with asphalt to prevent falling tools striking sparks and exploding the gas, and, incidentally, to maintain warmth. The heating is entirely beneath the floor, distributed through three tunnels beneath the floor level. Wiring, wherever possible, is on the outside of the shed. The powerplant is located some distance away, as is the gas plant, which will have a daily capacity for manufacturing 75,000 cu. ft. of hydrogen gas, later to be increased to 100,000 cu. ft. capacity.

Searchlights on two diagonal corners of the hangar will guide the dirigibles at night. On the other two corners are flood lights which will illuminate the field to the extent of 20 acres. Sunken lights arranged like crosses have been installed at the end of each runway, also to facilitate landings at night.

A 25-hp. electric motor is used to open each leaf of the doors. It performs the work of some 1500 men who would otherwise be employed at great loss of time in dragging the doors away from the entrance.

Power Required for Car Operation

Editor, AUTOMOTIVE INDUSTRIES:

This talk on operation on closed or nearly closed throttle is very much misrepresented. Based on operating a car in the city of New York there is some basis of truth, but for average conditions the idea that a car is operated on nearly closed throttle a majority of the time is truly rot. Under ordinary conditions the average car will do at a maximum about 45 miles per hour. This, under good conditions of level road and in the average shape that the usual owner keeps his car.

Now on usual road work I find in long distance running the average is around 25 to 30 m.p.h. or about two-thirds of the maximum.

In shorter runs quick acceleration and hill work take momentarily full throttle which brings up the average of power required.

While it is not my contention that a motor is run anything like constantly on a wide open throttle, the assumption that it is being run on the average from 75 to 90 per cent on nearly closed throttle is a pure fake.

I am not guessing at the above but base what I have said on my own actions combined with what I have noted on the road for many years. GEO. M. BROWN.

The terms part throttle and part load are sometimes used interchangeably, but are by no means the same. When, for example, we speak of one-quarter throttle, we sometimes mean that the throttle valve has turned through one-quarter of its maximum angular motion, sometimes that the throttle lever on the steering wheel has moved one-quarter of its maximum motion on the quadrant, sometimes that the area by the butterfly valve is one-quarter of the area when the valve is wide open, or sometimes that the power developed is one-quarter of the maximum developed at the same speed when the throttle is wide open. As a matter of fact the power depends, other things being equal, upon the area by the throttle valve and the speed of the engine. For example, when the throttle is one-quarter open the engine may, at low speed develop 90 per cent or more of the power it is capable of developing at that speed, whereas at high engine speed and the same opening it may develop 25 per cent, more or less, of the power it is capable of developing at that higher speed. For these reasons it is necessary to be quite specific when we discuss part throttle operation.

If, however, our correspondent means that cars are not operated at least 75 per cent of the time at less than one-quarter load we are much inclined to disagree, for there is ample experimental evidence to the contrary. For example, a certain American car weighing about 4300 lb. and equipped with an engine of 295 cu. in. displacement, geared 4.5 to 1, requires* the following b.hp. to propel it on the level: 2 b.hp. at 10 m.p.h., 5 at 20 m.p.h., 8 at 30 and 15 at 40. At the equivalent engine speeds the engine develops at wide open throttle the following b.hp. 15, 32, 48, and 62 respectively. Consequently the per cent of full load at which the engine runs is as follows: 13 per cent at 10 m.p.h., 16 at 20, 17 at 30, and 24 at 40. It will thus be seen that at speeds under 40 m.p.h. the power required to propel this car at constant speed on a level road is always less than one-quarter of that the engine is capable of developing at the corresponding speed. Similar conditions will be found to apply in case of other cars.—EDITOR.

*See paper by A. L. Nelson printed on p. 162 of AUTOMOTIVE INDUSTRIES issue of Jan. 27, 1921.

Radial Air-Cooled vs. Other Types of Aircraft Engines

Editor, AUTOMOTIVE INDUSTRIES:

I note that Mr. Heron takes exception to my statement that "air-cooled engines were made in the radial form for cooling reasons rather than aircraft requirements." I do not believe his objection is really justifiable in the light of practical experience to date. In his letter, Mr. Heron refers to the British RAF-4A air-cooled Vee-engine as an example of what can be done in constructing air-cooled engines in other than the radial or rotary form. According to the best information in my possession the engine weighed 4.17 lb. per b.hp. hour, had a fuel consumption of 0.68 lb. per b.hp. hour, and an oil consumption of 0.067 lb. per b.hp. hour. While these figures can undoubtedly be and probably have been improved on in other engines of this type, yet, the horsepower, weight, ratio and economy figures given, as compared with water-cooled engines, leave a great deal to be desired.

I wish to go on record as being a firm believer in the future of the air-cooled aircraft engine for certain purposes, and it is my conviction that the radial type offers the best field for development. I see nothing in the Vee type of air-cooled engine to commend itself except a reduction of resistance which in itself is open to question. The air-cooled radial engine has advantages in ease of cooling, ease of mounting, accessibility, compactness and possibilities in weight reduction, which to my mind would more than offset any slight increase in resistance as compared with the Vee-type of air-cooled engine.

Summing up, I think now, as always, that air-cooled aircraft engines will be used extensively in the future, and that of the three types, radial, rotary and Vee, so far constructed, the former has overwhelming advantages and deserves the greatest encouragement in development.

J. G. VINCENT,
Vice-President of Engineering,
Packard Motor Car Co.

TWO members of the Weights and Measures Division of the Bureau of Standards have recently visited several important gear manufacturers to obtain first-hand information as to the manufacturers' requirements in testing and measuring gears, gear cutters and hobs. Sufficient information was obtained to start the design of a machine for measuring the important elements of gears and gear-cutting tools.

The Significance of the British Coal Strike Settlement

The provisions of the British coal strike settlement show practically nothing that could not have been agreed upon before the strike. Demand for larger voice in management likely to follow. No one is satisfied; a temporary compromise is apparently all that has been achieved.

By Harry Tipper

THE final ending of the coal strike in Great Britain and the terms which have been agreed upon make it valuable to examine the character of this strike and the advantage secured by the workers, if any, to offset the amount of money lost and the net future revenue foregone in order to jockey for political advantage. Before the strike had been called, the government agreed to carry its subsidy for a sufficient length of time to enable the industry to swing over without undue hardship to the workers. The owners agreed to the profit-sharing principle, although the details were not worked out. The miners have secured in the adjustment of the strike practically nothing more than this allowance, except that the methods of profit-sharing have been worked out more completely in detail and provision is made for the supervision of the accounting in such a way that the workers' interest will be conserved.

The great principle of a national pool about which the miners made so definite statements is not included in the terms of settlement, the settlement being left to the various districts in accordance with their local conditions of settlement. This means that the local inequalities in wage will continue, and the local inequalities in profit on the profit-sharing basis will probably accentuate the individual character of the mining problem.

When due consideration is given to the desire on both sides to use the present situation for the pressure of advantage, the futility of uniform national machinery for the settlement of individual questions is very clearly shown.

The strike lasted about three months. How much it has cost Great Britain cannot be computed, because it will be many years before the total cost can be estimated. In the actual stoppage of industry the cost will run into the hundreds of millions of pounds.

The final settlement has secured no advantage for either side not suggested in the preliminary conferences before the strike actually occurred.

The only feature in the settlement worth considering at all is the extensive character of the profit-sharing agreement, affecting as it does all the workers in one of the basic industries. No experiment in profit-sharing of this magnitude has been attempted and there are no indications of its success in changing the situation.

Separate establishments do not make the same amount of money as profit, and this profit-sharing system adopted at the conclusion of the coal strike in Great Britain will lead to inequalities in the final rewards of the workers, due to the usual inequalities in the profits secured.

The miners have been very insistent upon a national wage and a uniformity of that wage. The present settlement does not lead in the direction of that uniformity, so that it does not lead in the direction in which this union organization has been moving for some time.

The miners have not shown disposition to accept any reductions in wages nor any reductions in their rewards, irrespective of the economic position of the industry and the effect of their demands upon the profits. There is nothing in the past history of the actions of the miners' unions that would indicate their willingness to base their reward upon the economic position or the profits to be secured in the industry. The present settlement indicates that a portion of their reward is to come from their share in profits. Whether they will expect to govern the prices in order that profits may be shown or whether they will accept the ordinary losses that occur from time to time in such a business is a matter for the future. Profit-sharing schemes have failed before now because the workers have not been willing to accept their share of the losses, and the disposition of the coal miners in their union action has not indicated any willingness on their part to accept such a situation.

A further question is likely to arise in connection with this powerful union and that is the question of their voice in the management of the mine properties. In some of their earlier demands they included the demand for a voice in the management, and this demand has not been less insistent than the other demands they have made. The present settlement does not carry any statements as to the management except those relating to the joint inspection of books, etc.

It would not be surprising if the present settlement led to a further demand for a larger voice in the management of the affairs of the mine properties, particularly as the profits will depend considerably upon the increased efficiency of mine operation.

Meantime there has been an increase in the standard wage and government provision for relief during the period of change. This last amounts to a government subsidy for the mine workers for a limited period.

The national pool and the national wage were political objects of the labor leader necessary to the continued growth of labor union power among its own members. Without nationalization of industry, labor unionism carried to the extent to which it has been in Great Britain has no object and cannot continue its development. It is based upon a program of uniformity, standardization and, therefore, of national agreement, and, finally, of nationalization.

Profit-sharing as secured in this settlement will not further the object of the labor union leader in this field unless such profit-sharing leads to a larger control of the management of the properties themselves. It emphasizes the difference where the object of the leaders has been to develop a common uniformity.

The uniform wage is a necessary part of the program for the continued development of labor union power and the control of production must be included in the objects, if the workers' organizations in Great Britain are to continue their growth along present lines.

These articles have pointed out many times the political aspect of the labor union movement in Great Britain, and the impossibility of securing any permanent settlement of industrial questions by means of these union developments.

It is significant that some of the leaders of the miners have stated that this is the last chance of peace in the coal trade under private ownership. This very statement would indicate that it is not a permanent settlement in the minds of the union leaders. They have accepted it under the conditions and with a faint hope that it may work out.

There is no evidence that the leaders are in full accord with the settlement or that they have abandoned their ideas on nationalization of mines and the development of a national wage system.

No part of their political program has been dropped in providing this settlement, although a good deal of it has been deferred until this particular compromise is given an opportunity to work out.

The very fact that the strike was allowed to go for three months and then settled on the basis previously suggested indicates that the settlement was made not because the objects of the strike were attained, but because the leaders felt that it was necessary to abandon the strike and to compromise upon any reasonable basis for the time being. The present settlement, therefore, does not satisfy the political desires of the labor party, nor the union objects of the miners. Its hope of success, rather, lies in its provision of opportunity for the individual worker to secure a reward based upon the value of the business and the individual advantage arising from the inequalities still existing in the settlement. This settlement, in fact, is a test of the strength of union organization among coal miners in many ways. If the union program is supported by a majority of the mine workers, this settlement would represent nothing more than a temporary compromise, accepted because it was necessary, but without agreement.

If the miner's interest in his own welfare and the maintenance of his local operations becomes of more visible importance to him under this settlement than the objects of the union, the power of the union to continue its further program will be lessened to that degree and the present settlement may become the basis of a future agreement.

None of the other important parties to the settlement are entirely in accord with its terms. The liberal middle-class opinion, as represented by the Manchester "Guardian," is distinctly doubtful of the outcome, and the owners have made the settlement without the feeling that the plan itself is one with which they can fully agree.

The main points in the agreement are given so that the terms of the settlement may be understood, and are as follows:

National and District Wages Boards to be established, with equal representation of both sides and independent chairmen.

District wages to be in the form of a percentage upon the district basis rates, periodically adjusted, and determined by the proceeds of the industry in each district, ascertained after joint audit.

Wages above the standard to amount to a sum equal to 83 per cent of the proceeds, after allowance for standard wages, for other costs of production and for 17 per cent of the aggregate standard wages to be devoted to standard profits.

A subsistence wage for low-paid day workers to be decided by the District Wages Board or, failing agreement, by the independent chairman.

Standard wage to be the basis rates existing in each district on March 31 last, plus district percentages payable in July, 1914, or equivalents necessitated by subsequent adjustments.

The minimum rate will be the standard wage plus 20 per cent.

Items of costs are to be decided by the National Board or, failing agreement by July 31, by the independent chairman.

Wages up to August 31 to be based on the results of July, and for September to be based on the results of July.

During the temporary period of three months the costs of production will be based on the average of the first quarter of the year. The reductions during this period are not to exceed 2s. per shift in July, 2s. 6d. in August, and 3s. in September, providing that the balance of the government grant is sufficient.

The agreement is to last until September, 1922, and afterwards only to be terminated by three months' notice on either side.

There is to be no victimization, and men engaged temporarily during the stoppage are to give way to men working in their places before the stoppage.

The coal fields are to be divided into thirteen districts for the purposes of the agreement.

Fuel Alcohol from Rice Straw

IN a paper recently read before the Indian and Colonial Sections of the Royal Society of Arts, Sir Charles H. Bedford referred to the production of industrial alcohol from rice straw. The suggestion to use rice straw came from Arthur Rogers, C.B.C., shortly after the termination of the war. Sir Charles decided on Burmah as a suitable sphere for operations and was able to secure the support of the Burmah Oil Company for carrying out experiments on a manufacturing scale. A distillery and laboratory have been erected at the company's refineries at Rangoon and experimental work has been carried on there, as well as in England. The work is still in progress, but Sir Charles thinks it will shortly have been carried far enough for demonstration purposes, and he, and other technical and commercial experts, are satisfied with the results obtained. Other materials than rice straw will also be used to keep the plant in operation at all seasons of the year and this feature, combined with the utilization of certain by-products, is expected to materially reduce the cost of production.

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More About Commercial Bribery

RECENTLY we called attention in these pages to House Bill No. 5632, pending in Congress, which provides a strict penalty for the bribing of employees to induce them to recommend certain kinds of material as the proper purchase. It is the habit of manufacturers to-day to assert that this practice has been stamped out. Despite this belief on the part of many employers, the practice persists. The paint, varnish and glue industries have been seeking to rid themselves of this practice recently. The following paragraph is taken from a complaint filed with the Federal Trade Commission against a glue manufacturer:

> That respondent in the course of its business, gives and has given to superintendents and other employees of proprietors of cabinet manufacturing establishments, and other establishments, without the knowledge and consent of the employers of such superintendents and other employees, cash commissions or gratuities, usually amounting to five cents per pound for all glue sold to said establishment by respondent, to induce such superintendents and employees to favor and recommend, and influence their employers to purchase, the products of respondent, and to refrain from purchasing the products of its competitors, and without other consideration therefor; that the total sales of glue made by respondent exceeds $500,000 annually; that such cash commissions and gratuities so given by respondent to the superintendent of the cabinet factory and to other employees of one of its customers, to-wit: the Talking Machine Company, during the two year period ending Jan. 1, 1921, aggregated approximately $34,000, which resulted from the payment of a cash commission of five cents per pound on all glue sold by respondent, to such customer, for which glue respondent received thirty-five cents per pound; that respondent adds to its annual cost of doing business a sum equal to that paid out for cash commissions and gratuities as aforesaid, and is compelled to, and does add to the selling price of commodities sold by it, an amount sufficient to cover the amount so paid out for cash commissions and gratuities, which is in addition to the fair market value of such commodities.

This complaint goes on to state, in legal wording, that under such conditions it is quite impossible to have free and fair trade conditions. The company to whose employees this bribe money was paid is often referred to as one of the best-organized manufacturing companies in the country. Now that this bribery is discovered, the employer is helpless and cannot punish either the giver or taker of the bribe beyond his ability to discontinue his purchases from one and the discharge of the other.

Apparently there is a place for a law that would punish persons who betray their positions of commercial trust.

What's the Difference?

SOME storage batteries supplied regularly with certain cars have a useful life of three or more years. Others supplied in similar cars of about the same grade have a life of one year or less. What's the difference between the two in first cost to the manufacturer, in replacement cost to the user, in construction, in bulk, in weight? These are pertinent questions in which a great many people are interested.

The number of factors which govern the life of a storage battery is admittedly great. Some of these are beyond the control of the battery manufacturer and the car builder, hence alibis are not difficult to find, and "passing the buck" becomes a favorite pastime when an effort is made to place the responsibility for the failure of a battery which must be replaced before it has served as long a life as can reasonably be expected. Almost invariably the car owner is the goat, for it is he who pays for the new battery, frequently after a period of difficulty in starting or ignition trouble, which sometimes occurs when a replacement battery is difficult to obtain.

Since, in nearly all American cars, the ignition, starting and lighting systems are largely or wholly dependent upon the battery, it seems evident that the car manufacturer should make certain that the battery equipment is at least on a par with the rest of the car in quality, instead of the weakest link, as it now appears to be in many cases. It is often said that some battery manufacturers sell to car makers batteries which not only are far too light and small for the service they will be called upon to perform, but sell these batteries at, or substantially at, cost,

figuring to make their profit in retail replacement sales at prices three or four times as great as the price to the car manufacturer. This would not be quite so bad if the expense ended with the first replacement, but the second battery is usually as inadequate as the first, since the user is not in a position to judge as to the basic reason for the failure, and, even if informed concerning the true facts, is unable to correct the fault for lack of space for a larger and more durable battery.

Whether this is a true picture of the average or quite general case, we do not know. We do know that a large percentage of batteries fitted are of inadequate size, and that they are a source of serious annoyance and expense which might be mitigated if the car manufacturer would spend a few extra dollars in providing a properly proportioned battery at the start. In so doing we believe he would serve his own best interests by avoiding service troubles. It is well to remember that a few extra dollars spent by the manufacturer will often save the user many times that amount. Ten dollars more spent in the original battery equipment may, for example, provide a battery that will last three years, whereas with the cheaper equipment two replacement batteries, perhaps costing the user $40 each, in addition to the original, may otherwise be required to cover the same period of operation.

The day has passed when it is considered good business to build cheaply without regard to serviceability. The reputation which comes from failure of the finished product to perform with satisfaction over a reasonable period of time is not an enviable one.

We feel that there is need for more education, or at least more general appreciation of the facts, in regard to battery equipment and shall, as in all subjects of similar import, be glad to carry in our Forum columns an expression of the views of those interested in this important subject.

Fuel Prices and Fuel Development

ONE of the hopeful signs as regards the immediate future of the automotive industry is the decrease in the price of fuel. Where a year ago as much as 34 cents per gallon was charged for gasoline at retail, it can now be bought for 26 cents, a decrease of 23.5 per cent. This tends to equalize matters in those branches of the industry where there is competition with other means of transport and traction, though, of course, the decline has been not at all commensurate with the drop in the cost of horse feed.

The cost of production of motor fuel depends largely on the cost of labor, and with the present situation in the labor market a gradual reduction in fuel prices is naturally to be expected. Another factor of importance undoubtedly is the general economic situation. Although the number of automobiles, trucks and tractors in service is probably greater than ever before, it is quite likely that the passenger cars, which, after all, consume the bulk of the motor fuel, are in many cases not being used as intensively as formerly and that, as a result, stocks of gasoline are accumulating. A decrease in fuel prices will, of course, encourage increased use of cars.

The present decline in the price of gasoline will, no doubt, tend to check the development of substitute fuels. This development in this country has been entirely of a sporadic character. Interest in it declined some eight years ago, when the introduction of the cracking process resulted in a material decline in fuel prices and rose again when war activities led to an unprecedented demand for petroleum fuel, followed by a rapid rise in prices. In spite of the cost estimates sometimes furnished by optimistic inventors, it is fairly obvious that no fuel made from vegetable material specially grown for the purpose, or from mineral materials by involved processes, can compete with petroleum distillates so long as petroleum can be pumped from the ground in sufficient quantities. Therefore, while reports of the invention of new motor fuels occur in the newspapers at short intervals, they create hardly a ripple of public interest.

It is to be hoped that the decrease in fuel prices will not be the signal for cessation of effort to improve the economy of automotive engines, for the need for such improvement is just as real as ever. Prices of other commodities are also falling. The decrease in the price of gasoline may indicate only a temporary adjustment in keeping with the times, rather than a permanent reflection of supply and demand factors. Efforts to decrease waste are always commendable, and there is no lack of evidence that the car of to-day is wasteful of fuel. The world-wide effort to gain control of petroleum reserves is in itself a sufficient indication of the importance attached to providing a supply of this fuel for the future. Let no one be deluded into thinking that it is less necessary than formerly to conserve our domestic supply.

License by Weight

AN interesting experiment in the licensing of automotive vehicles is under way in Kansas, where the fee is based on weight of the motor car or on the useful load to be carried by the truck. Previously the license fee has been based upon the horsepower of the car and any one of several rather unsatisfactory bases for trucks.

When the Kansas license officials undertook to carry out the law, they found some unexpected (to them) obstacles. First was an inability to obtain a list of weights of the various cars. The Secretary of State wrote to the factories for the shipping weight, as he interpreted the law to mean the gross weight of the motor car as it stood in the salesroom. The weight adopted does not include gasoline, oil or water. In instances where the manufacturer did not supply a statement of the weight, the licensing officials caused an applicant for a license for a particular car to take the car to a scale.

There has always been objections to the license fee based on the horsepower of the motor car, the objectors asserting that this was in the nature of a luxury tax. A comparison of the fees involved in the two methods would shed some light on the subject of fairness of the two methods.

July Business Surpasses Early June

Barometer of Trade Rises Along Coast

California Shows Steady Gain with Every Prospect for Improvement

SAN FRANCISCO, CAL., July 20.—The barometer of trade in all branches of the automotive industry is rising steadily in California. The southern part of the State is busier in these lines than the north, but the north shows steady gain, with every prospect of improvement. It is still a buyers' market, and the buyers are more critical than ever, but more people are buying cars than have been buying them for the past eighteen months. In other words, the market for the right car, at the right price, never was better in the territory for which San Francisco is the center of distribution for automotive vehicles and equipment.

This is a brief summary of conditions as voiced to the correspondent of AUTOMOTIVE INDUSTRIES by a large number of dealers in San Francisco and in Oakland and Berkeley, on the eastern shore of San Francisco Bay. General reductions in the prices of virtually all cars is held to be responsible for the improved trading, but greater freedom of money and better prospects also are indicated by the increased demand for used cars, on which prices are virtually the same as they have been for the past six or eight months.

In no other industry on the Pacific Coast is this tendency to get back to a wholesome pre-war basis in the matter of movement of goods, merchandising prices and desire to buy, more marked than in the automotive industry. The demand is for the best possible car at the right price, and the reduction in prices by the factories, without reduction in quality of car delivered, has been a factor in bringing about the improved condition.

The passing of the so-called "price flurry" seems to have stabilized the business of buying, selling and distributing automobiles to greater degree than any one factor since the dealers came to realize that the time of hustle-for-orders, rather than sit-down-and-wait-for-buyers, had arrived.

Denver

DENVER, July 20—Automobile sales seem to average slightly better than for the first half of June with less restless-

(*Continued on page* 146)

JULY SALES BRISK IN ALL DISTRICTS

NEW YORK, July 20 — Dispatches to AUTOMOTIVE INDUSTRIES from its correspondents in the principal distribution centers show that the volume of automobile sales at retail for the first half of July has been extraordinarily good as compared with the same period in June. While it is probable there will be the perennial mid-summer decline in the sales curve, it has been deferred later than usual in many cities. July business thus far has been better than either dealers or manufacturers dared hope it would be. Up to this time there has been practically no curtailment of factory operations and in some instances schedules have been increased.

Sales for the first half of July were better than the first fortnight of June in these cities: Detroit, Des Moines, Denver, Salt Lake City, Dallas, Cleveland, Columbus and Indianapolis.

July sales have held their own with June in Chicago, Milwaukee and Philadelphia.

July has shown a falling off as compared with June in New York, Minneapolis, New Orleans and Atlanta.

The Metropolitan slump is due to the universal exodus to summer resorts by persons able to buy cars. In the Northwest interest is centered on the harvest. In the South the continued low price of cotton has exercised a depressing influence.

San Francisco reports increasing business while Toledo and Louisville are holding their own.

Chicago Keeping Pace with Business of June

CHICAGO, July 20—Business for the month in Chicago is keeping up the pace established in June, and June business, under the influence of reduced prices, was far in excess of recent averages. Buick, Studebaker and Dodge are leading the medium priced car field, but practically all dealers declare sales conditions satisfactory.

Country sales are still slow, but showing improvement. There are an increased number of inquiries along the Row, a fact which convinces dealers that there will be a continued steady demand, with a likelihood of a spurt in the agricultural districts following harvesting.

Salt Lake Territory Shows Improvement

Retail Business Holds Up Well During First Two Weeks of July

SALT LAKE CITY, July 20—Retail automobile business in the larger cities and towns in the Intermountain territory has shown a steady improvement during the first half of July. Salt Lake, Ogden and Provo, Utah, and Boise, Idaho, dealers, are showing a better working spirit than is manifested by the less highly organized dealers in the smaller towns and communities. Wholesale business is at a standstill and dealers are largely dependent on their retail efforts to equalize their sales.

The retail business is holding up well under the general business slump largely because sales managers and salesmen are overlooking no opportunities. Salt Lake distributers particularly are diligent in pursuing prospects. Tourist trade during the last six weeks has aided the industry materially and the repair business is by this reason considerably better than during the spring.

Price reductions coming on the 1st of July have also helped to stimulate sales. Tires, accessories and batteries are registering a lively trade.

P. F. Drury, assistant general manager of the National Automobile Dealers Association, is visiting in Salt Lake. At an address before the Intermountain Automotive Trades Association he stressed co-operative methods and association work. From here he will go to Boise, then to Portland, Tacoma, Seattle, and he will be in Spokane the 27th, 28th and 29th of this month to attend the annual meeting of the Washington Automobile Chamber of Commerce.

Philadelphia

PHILADELPHIA, July 20 — Retail automobile sales for July thus far compare very favorably with June sales. Prospects are for considerably improved trade. Sales of new cars are 45 per cent of the entire June sales. This is considered owing largely to reduction of prices which is now considered over.

Another good sign is the falling off in sales of used cars which were good earlier in the season but now are quite flat. In new cars high priced automobiles are beginning to sell as well if not better than the less expensive types.

Truck sales continue dull. The trucking business is not heavy.

Sales Increase Holds Up in Nation

Notable Sales Made in New York District

July Not Subnormal in Metropolitan Buying—Vacations Cause Usual Slowup

NEW YORK, July 20—Passenger car sales which ran high throughout June in the metropolitan territory have dropped considerably during July up to date and the majority of dealers expect the falling off for the month to be more or less comparative with that which prevailed in normal years before the war.

Oldsmobile, Scripps-Booth and one or two other cars which had price reductions late in June after the novelty of most of the competing reductions had worn off sold better during the first two weeks in July than in previous months. However, the normal run of cars including the strongest sellers have showed considerable dropping off in day by day sales.

The indications are that the July sales record will be considerably below June, but nothing subnormal as July goes in New York City, with a great many people in the automobile owning class out of town on vacations.

Some notable sales records were made during June. Dodge sold at retail within the limits of New York City more than 400 passenger cars and 100 trucks. It is said that this has not been equalled except in cases where distributors included sales in outlying territories in their New York reports.

Nothing has developed to indicate that there will be any severe curtailment of buying during July and August. Dealers generally expect business to be slow but in this respect they will just be going back to normal conditions prevailing before the rush for cars two years ago.

Indianapolis

INDIANAPOLIS, July 20 — It is expected that retail sales for the first half of July will beat sales for the same period of June by from 10 to 20 per cent. Dealers say that sales are good for the time being but they are pessimistic concerning future business. Those dealers handling cars on which reductions were made last month or during the last six weeks are reporting an exceptional business which will show a dollars and cents increase in spite of reductions. Dealers in the higher priced cars say business is showing better so far this month than it has during the year and these dealers are rather confident concerning business during the remainder of the year. It is probable that Studebaker and Haynes cars are leading the field in their class, while the dealers in Dodge, Ford and Chevrolet all report increased sales during the month. One reason for the increased sales made, dealers say, is the fact that money is loosening up a little, though credits are yet very much restricted. Business in used cars also is showing a decided increase and dealers say that if the industrial situation continues to improve it is probable that further increases in used car sales will be recorded.

Milwaukee

MILWAUKEE, July 20 — The June record of retail sales for Milwaukee and vicinity will be maintained for the first half of July. Representative dealers see no indication of material slowing tendency but do not expect inflation during the remainder of the summer. The public apparently is not satisfied that prices have reached bottom. Rumors of impending supplementary reductions in Ford prices early in August have a disturbing influence on account of the expectancy that other cars must follow.

Expressions by eight big dealers give a general average of equality between sales for the first half of June and July. Distributors report wholesale business smaller, which is customary following the passing of midyear with country districts busy with crops.

Detroit

DETROIT, July 20—Steadily increasing averages mark daily sales of Detroit dealers in standard automobiles. Volume for the first 14 days of July indicates an average increase for the month over June of 28 per cent. Largest per centage of increases were reported by Dodge, Overland, Buick, Oldsmobile, Studebaker and Hupp dealers though practically every one reports better business than in June.

Careful investigation of conditions by officials of the Detroit Automobile Dealers Association shows distributors and dealers optimistic and confident that the increased demand is not a flash in the pan but normal spring business delayed by unsettled price conditions and bad weather during April and May.

Price cuts naturally proved a stimulant to buying and nothing is in sight now to indicate a slump in demand, according to Guy O. Simons, president of the dealers association.

20 Per Cent Increase in Des Moines Field

July Sales Will Beat Those of June—See All-Summer Business

DES MOINES, July 20 — Interviews with 10 leading Des Moines dealers show that stimulation of business has held up well during the first half of the month, in fact, improvement of approximately 20 per cent over June is noted by all dealers. This refers only to retail city sales as country business with the exception of Dodge, Overland and Ford is practically at a standstill. Final figures for June showed 10 per cent improvement over May.

Eight of 10 dealers interviewed forecast continuance of present business until late September or early October. The other two expect a let down by late August. Truck sales are at a minimum.

Second hand car business is brisk at readjustment prices. Money is somewhat easier in the city and collections are fair but there are no signs of improvement in credit conditions in the country. July sales in the city are practically on a par with July, 1920. The major part of the improvement over conditions of spring and early summer is attributed to the stimulation of price cuts.

Minneapolis

MINNEAPOLIS, July 20—Business in automobiles has shown a slump in July as compared with June in the Northwest territory. Just now the farmer mind is centered on his harvest and a new spurt cannot be expected until this harvest is in. Crop conditions are generally favorable notwithstanding the long period of hot weather. With a good harvest better conditions are expected.

The Fourth seems usually to be a cut-off line in the motor business and at that time the public loses interest in new cars, all having bought that have considered the matter seriously. A firm which did three times its business of June last year notices the slump strongly.

A large distributing firm with a crop service of its own, which reports a big drop in sales as compared with June last, believes crop news from the sunburnt districts is mostly local and the crop as a whole promises well, if not a bumper, as expected. In North Dakota three-fourths of the State shows an exceptionally good outlook, in fact, better than last year.

Leaf Spring Forms Group in M. A. M. A.

Second to Organize Into Separate Body—Score of Others to Follow

NEW YORK, July 18—The Leaf Spring Institute has dissolved as a separate organization and will continue its work as the leaf spring group of the Motor and Accessory Manufacturers Association. It is the second to be organized of some 28 groups of manufacturers with more or less like interests which will be formed within the M. A. M. A. H. R. McMahon, president of the Standard Steel Spring Co., has been elected chairman of the group, Mason Rumney of the Detroit Steel Products Co. vice-chairman, and E. R. Busby of the William & Harvey Rowland, Inc., secretary and treasurer.

Plans for the organization of the entire membership of the M. A. M. A. into groups will be carried out at once. The two groups already formed will be followed by groups in the following lines:

Asbestos products, axles, bearings, bumpers, carburetors, chains, clutches, engines, fans, forgings, foundries, gears, lamps, piston rings, radiators, shock absorbers, spark plugs, springs, startings-lightings-ignitions, steel producers, steel products, tires and tubes, tops, transmissions, warning signals, wheels, wind shields.

Among the subjects now before the association for standardization consideration and which will be referred to the respective groups following the division of the membership, are:

Design, purchasing specifications, construction, materials, cost systems, specifications, weights, dimensions, sales contract forms, packing, shipping, invoicing forms, guarantees, advertising, service methods. Upon a group taking favorable action on any subject of standardization, which will be by two-thirds of its members approving, the plan shall become effective by approval of the board of directors of the association.

A significant feature of the group plan is an arrangement whereby the chair men of all groups constitute an advisory committee to the executive committee of the board of directors and an advisory board to General Manager M. L. Heminway. The president, first vice-president, secretary and general manager and general counsel of the association are ex-officio members of all groups.

BATTERY COMPANIES MERGE

MARSHFIELD, WIS., July 18—The Stewart-Galvin Battery Co. and the Stewart Storage Battery Co. have been consolidated in a new corporation to be incorporated in Wisconsin, which has decided to locate its permanent works and headquarters in Marshfield, Wis. For the present the company will occupy the building of the Marshfield-Franklin Co. and employ 50 to 75 operatives.

WANT NEW YORK SHOW AT GRAND CENTRAL

NEW YORK, July 20—The 1922 New York automobile show will be held, in all probability, in the Grand Central Palace instead of in Madison Square Garden as originally proposed. Negotiations to this end have been practically completed although a few details remain to be cleared up. This arrangement, which will be eminently satisfactory to every one concerned, is made possible by the fact that plans for converting the Palace into an office building have been delayed. The Garden still is available in case of emergency but its use would involve very heavy expense because of alterations which would be necessary in the building. The rental charged for the Palace will be much higher than in the past but the N. A. C. C. has decided that nothing must be permitted to interfere with the success of the show next year.

$6,000,000 in Contracts Let for Roads on Coast

SAN FRANCISCO, July 20—Contracts for construction of highways, let by the State of California between Jan. 1 and July 1, this year, number 35, with total value of $6,000,000. The work is distributed all over the State, and bids on other sections are now being asked, with prospects that a total of half as much more will be let within the next ninety days. The State-wide extent of these road construction contracts may be gathered from the fact that the work is in the following counties:

Fresno, Tehama, Shasta, Santa Barbara, Kern, Humboldt, Butte, San Luis Obispo, Mendocino, Placer, Nevada, Sacramento, Amador, Solano, San Mateo, Tulare, Los Angeles, San Diego, Mono, Mariposa and Glenn.

The United States Bureau of Public Roads has signed up with the California State Highway Commission for the expenditure of the remaining money in the allotment of $2,896,071.77 given to California under the 1921 allotment of Federal road moneys. The money will be spent on 24 highway projects in this State. This agreement puts all the money available for California under the 1921 allowance actually to work, under way, or agreed upon. The moneys available for the 1922 allotment will have been agreed upon or put to work before June 30, 1922.

PATRIOT REORGANIZES

LINCOLN, NEB., July 18—The Patriot Motor Co., manufacturer of Patriot trucks, which has been operating under a receivership since last November, has been reorganized and will continue in the truck field. The assets recently were acquired by a new company.

Coast Trade Is Good, Says Goodyear Man

Los Angeles Factories Increased Production 47 Per Cent Since March

AKRON, July 20—Business conditions are improving rapidly on the Pacific Coast with every indication of a quick return to normal, according to A. F. Osterloh, former sales manager of the Goodyear Co. of Akron and now vice-president and general manager of the Goodyear Co. in Los Angeles. Osterloh and other California Goodyear officials arrived in Akron to-day for a conference with President E. G. Wilmer, relative to production on the coast.

The Los Angeles Goodyear factories have increased production 47 per cent since March, now being on a basis of 3500 casings and 3700 tubes daily, according to Osterloh. This is the largest production in the history of the Western company which started production in June, 1920. With the demand for tires steadily increasing, further production increases are contemplated both in Akron and at the Pacific Coast factories. The Akron factories report this week's dealers' business was the heaviest in the company's entire history. Stocks are low and indications point to a tire shortage if the present rate of buying continues, unless manufacturers greatly increase production. It is stated by experts that there is now less than a 30-day supply of tires on hand in the United States. Experienced tire builders considered desirable for re-employment in the Akron factories are scarce. The Akron tire factories are endeavoring to build up their forces by putting on married men and home owners, and are trying to prevent an influx of transient floaters to Akron.

Here for Conference

In the California party now in Akron are Osterloh, C. C. Slusser, factory manager at Los Angeles; Sales Manager J. R. Reilly, and Treasurer W. A. M. Vaughn. C. H. Carlysle, treasurer and general manager of the Goodyear Canadian factories, also is here to confer with Wilmer as to plans for increased production. Other Canadian officials here with Carlysle are R. P. D. Graham, vice-president of the Canadian Goodyear Co.; H. C. Lower, sales manager; H. G. Layne, assistant treasurer, and E. H. Koken, general superintendent.

RECEIVERSHIP IS DENIED

KANSAS CITY, MO., July 20—Application for a receiver for the Beggs Motor Co. of Kansas City, manufacturing the Beggs car, was denied in Independence, Mo. The court, upon hearing, decided that on the showing made the company was not insolvent. Stockholders having a small amount of shares brought the suit.

Packard Dealer Gets Durant Car On Coast

Earle C. Anthony Will Handle New Make at Four Important Pacific Points

SAN FRANCISCO, July 20—First announcement regarding the marketing of the new Durant car in California is released by R. C. Durant of the Durant Motor Co., with the news that Earle C. Anthony, Inc., for 16 years Packard distributors in this State, will handle the Durant at the four most important distributing points in California—San Francisco, Oakland, Sacramento and Los Angeles. In all of these places the Anthony organization has branches.

At the same time, Mr. Anthony announced that George R. Bury, who, until July 1, 1921, had been general sales manager of the Packard Motor Car Co., had been appointed vice-president and assistant general manager of Earle C. Anthony, Inc., and will devote all his efforts to northern California territory. Bury had been more than fourteen years with the Packard company. The arrangement between the Durant company and the Anthony firm marks an alliance between America's newest car and one of California's oldest and strongest automobile concerns. The founder and president of the distributing company is Earle C. Anthony, a pioneer in the motor car business in this State, having entered the business in Los Angeles in 1904. In 1905 he became Packard distributor for Southern California, acquiring the whole state for that line four years ago. More than eight years ago he entered the state distributing field, at that time with Chalmers, but this was replaced in 1915 by the Reo, which Anthony relinquished July 1 in order to devote the entire energies of his company to the Packard line and to preparations for the marketing of the new Durant upon its arrival. The Anthony organization conducts its own stores in San Francisco, Oakland, Sacramento, Fresno, San Jose, Bakersfield, Los Angeles and San Diego.

R. C. Durant heads the Durant Motor Co. of California, a subsidiary of the Eastern parent concern, and a $3,000,000 factory in Oakland will be producing Durant cars by December of this year. Associated with R. C. Durant are C. M. Steves, A. L. Warmington, George R. Scott, H. T. McKnight and Charles H. Durham.

RECEIVERS ARE OPTIMISTIC

COLUMBUS, July 20—Receivers W. C. Willard and George A. Archer of the Allen Motor Co. of Columbus announces that orders are coming in much better and that during July it is planned to turn out 200 cars, all on orders. The outlook for the future is now much brighter, according to the receivers. A total of 200 workmen are now employed at the Columbus and Bucyrus plants.

TRAFFIC SO GREAT WILL WIDEN ROADS

HARRISBURG, PA., July 18—Preliminary studies of projects for increasing the width of main State highways entering the larger cities of Pennsylvania so that they may be ultimately extended to 100 or 120 feet, are under way by State Highway Department engineers. The rapid increase in motor traffic has made it imperative to create future building lines. Studies nearest Philadelphia have been in Delaware, Buck and Montgomery counties and in the Main Line district.

Warehousemen Urging Service Parts Stations

LAKE OF BAYS, ONT., July 18—The National Furniture Warehousemen's Association, comprising more than 500 household goods and furniture storagemen, the majority of whom operate motor trucks, adopted a resolution today, at its convention here, addressed to the unit parts manufacturers of the country requesting them to establish service parts stations where distributors and agents could furnish not alone present supplies but parts long considered obsolete.

The resolution set forth that if such stations could be established where both old and current models of parts could be obtained, this would tend to stabilize prices, would prevent price advances, would assure immediate deliveries for customers and would give the maximum efficiency to which those patrons were entitled.

The Pacific Coast Furniture Warehousemen's Association and the California State Draymen's Association have adopted a similar resolution it was disclosed.

REMY ELECTRIC TO REOPEN

ANDERSON, July 20—Remy Electric Co. plants which closed down July 8 will reopen next Monday, according to announcement. New business added to incompleted orders in sufficient quantity for operation on the same scale as has existed for several months is understood to have been added. Higher efficiency of labor is said to be one factor in the reduced force that has been operating the plant.

RECEIVER FOR TIRE COMPANY

INDIANAPOLIS, IND., July 20—The petition for the appointment of a receiver for the Federal Rebuilt Tire Co. of this city was filed by H. R. Morgan & Co. recently, alleging that the company is in danger of insolvency. Jacob Morgan, a local attorney, was appointed receiver for the company by Judge Solon J. Carter and has started to work out the company's affairs.

Million in Revenue for Standard Parts

Receiver Reports Rush of Business—Profits Large in Last Two Months

CLEVELAND, July 20—The Standard Parts Co., a $20,000,000 corporation making automobile parts and accessories, which has been in the hands of a receiver since last September, has been making money in the last two months.

John Younger, who is in charge of operations for Receiver Frank A. Scott, says that the company's showing is proof that the automobile industry is healthy and business is good. The Standard Parts in recent months has obtained considerable new business and has taken on some big contracts from concerns that are operating at capacity and are rushed with orders. The gross revenues have been running approximately $1,000,000 a month lately.

Action taken by this corporation on July 1, in consideration of the recent reductions in prices of steel announced by the United States Steel Corporation and the Bethlehem Steel Corporation, is regarded significantly by the trade here.

Since July 1 the Standard Parts has been quoting low prices on springs, tubings, rims, and other products manufactured by the corporation.

For some time the corporation has been operating all of its plants, as follows: The Bock Bearing, Perfection Springs, Standard Welding, Eaton Axle, Canton Drop Forge, and Pontiac Spring Co. No statement was made at the local headquarters offices with respect to the size of the staffs working, but it was learned that it is near normal. In addition to the above plants, the corporation is operating spring service stations in New York, Boston and Cleveland.

The receivership has helped officers of the company greatly by giving the corporation stability in these times. It has the power of the United States court back of it and with this backing all orders are being promptly fulfilled.

A short time ago the common stockholders asked the court to continue the receivership for the time being.

The creditors of the company are to meet here August 10 to discuss what shall be done with respect to the receivership. They had advanced a plan for the formation of a new company to take over the assets from them and reports will be made on the progress of this at the meeting. Stockholders have not regarded this proposal with favor.

H. C. S. TO MAKE CLOSED BODIES

INDIANAPOLIS, IND., July 20—The H. C. S. is planning to get into the manufacture of closed bodies some time in August. At the present time the company has completed its first limousine. The job has wire wheels and the body is of aluminum construction.

Committees Study Contract Changes

N. A. C. C. and Dealers Considering Amendments Covering Cancellations, Etc.

NEW YORK, July 18—The committees representing the National Automobile Chamber of Commerce and the National Automobile Dealers' Association in the promotion of closer relations between the manufacturers of motor cars and their distributers are giving close consideration to proposed amendments to the present form of contract. Three important changes have been proposed by the dealers. They cover cancellations of contracts, allotments of motor vehicles and depreciation in the value of motor vehicles and parts. These are the major points covered.

Directors of the N. A. C. C. were to have considered the subject at their meeting in Buffalo last week, but the draft of the proposed changes was not received from Harry Harper of Philadelphia, former president of the N. A. D. A., until just before the meeting opened, and it was decided to defer any discussion until there had been opportunity to study the subject. In the meantime they will be taken up by the committees in preparation for a joint meeting, which will be held in the near future at a date not yet determined.

The committees representing the two organizations are carrying on their discussions in the most friendly spirit and marked progress has been made in the deliberations. There is evident a strong spirit of mutual helpfulness with the realization that what helps the dealer helps the manufacturer and vice versa.

In addition to contractual relations, the dealers are expected to urge that changes in models and prices be announced in future at the time of the big shows instead of spreading them over the entire year.

The N. A. C. C. directors at their Buffalo meeting decided to take a monthly census of production and sales in the industry to be reported to Secretary of Commerce Hoover, as he has requested. Only the totals will be given and there will be no details concerning individual companies.

In connection with the $5,000 which will be offered in prizes to the school children of the country for the best essays on accident prevention on the highways, it was decided to offer special prizes to the teachers who supply the best lessons on "safety first." The prizes will include cash and trips to Washington.

REFUSES REFUND ON TAXES

RALEIGH, N. C., July 20 — State Treasurer B. R. Lacy has formally declined to make any refund of automobile license taxes paid to the State by automobile manufacturers or their representatives in the State. J. S. Griffin, a Raleigh attorney, representing the Olds Motor Works, the Kissel Motor Car Co., the Cole Motor Car Co. and the Marmon Motor Car Co., had made formal demand on the treasurer for a total refund of $6,000, representing sums paid in by his clients in compliance with the State law. Invalidity of the revenue act, so declared by the United States Supreme Court, because of discrimination in favor of North Carolina corporations is the reason assigned for the demand. Treasurer Lacy, replying to the formal demand, says: "In reply will say that after consultation with the attorney general I am advised by him not to refund any of these license taxes."

Airplane Inquiry Will Disclose Engine Ideas

WASHINGTON, July 20 — Information of great value in designing airplane engines in the United States is promised by the Bureau of Standards in forthcoming final reports to be made in connection with a thorough investigation that has been completed as to the performance of two well-known makes of German airplanes. The investigation was made through co-operation between the Bureau and the Air Service at McCook field.

The two engines which have been investigated are known as the B. M. W., 185 hp., and the Maybach, 300 hp. Both machines are of the 6-cylinder type which has long been a favorite in Germany.

It may be of interest to note, the Bureau reports, that the performance of the B. M. W. engine at high altitude was excellent, its low fuel consumption being the outstanding feature of merit. The chief point of interest in connection with the Maybach was the design of the carbureter, which, however, cannot be considered as entirely satisfactory as, although it gave excellent economy of fuel, the efficiency of the engine at part load was rather poor.

COURT HALTS USE OF NAME

NEWARK, N. J., July 20—Samuel Ehrlich of the Hudson Tire Co., Inc., of this city has just obtained an injunction in the United States District Court, Southern District of New York, against the Hudson Tire & Rubber Corporation, W. M. Doucette, H. B. Seymour and Ulrich Wiesendanger, restraining the corporation and its officers from using the name "Hudson" in connection with their business.

Ehrlich claimed that the defendants were fraudulently making use of the name "Hudson" in connection with their business, well knowing that Ehrlich had been doing business as Hudson Tire Co., Inc., in Jersey City and Newark for several years.

Ehrlich has been selling Hudson tires in Newark, all of the New England States and practically throughout the United States, and is now arranging to establish agencies for the sale of his tires in every State and section of the United States.

Palmer Charged with Undue Favoritism

Bosch Magneto Sale to Supposed Friend "Fixed," Complaint Says—Makes Denial

NEW YORK, July 18—Charges first made last year that A. Mitchell Palmer had shown undue favoritism to Martin E. Kern of Allentown, Pa., in the sale of the assets of the Bosch Magneto Co. which were sold by Palmer as Alien Property Custodian in 1918 for $4,150,000 have at last been made openly. The company then was reorganized under American control as the American Bosch Magneto Corp. The allegations have been denied by Palmer as "part of a drive by Germans to influence Congressional action so that they may regain their properties sold when this country was at war with Germany."

It is asserted that Kern was "a close friend and business associate" of Palmer, that Kern valued the property at $8,000,000 three weeks after he bought it, and that the auction of the assets was "fixed" so there would be no competitive bidding. It also is charged that:

The Bosch company's controlling interest in the Boonton Rubber Manufacturing Co., of which the Bosch company held more than one-half the stock, was held for $1,000 to Kern.

The 130 patents held by the Bosch company were sold to Kern for $1. The Reading Standard Co., manufacturers of motorcycles, of which the Bosch company held more than one-half the stock, was sold for $1.

The St. Louis Car Co., in which the Bosch company invested $100,000, was sold for $1.

The good-will of the company and its various valuable trademarks were turned over to the purchaser gratis.

Palmer did not advertise the sale widely, and held it "in the woods" on the outskirts of Chicopee, Mass.

Palmer characterizes all the allegations as "nonsense." The whole question was threshed out before the Senate Judiciary Committee two years ago, he asserts, when his name was presented for confirmation as attorney general and the committee decided unanimously that the charges against him were unfounded.

SOUTH CAROLINA USES LESS GAS

COLUMBIA, S. C., July 20 — South Carolina used less gasoline and kerosene for the first six months of 1921 than for the first six months of 1920, according to figures compiled by H. W. McCreight, chief clerk of the Department of Agriculture. From January through June this year 28,161,768 gallons of gasoline and kerosene were shipped into South Carolina, as compared with 31,787,608 in the same period of 1920. These figures are available from the tax imposed on the two products and do not absolutely mean that more gasoline and kerosene were used in the first period than in the second. The figures for gasoline alone are: For the first half of 1920: 21,291,739; for the first half of 1921: 18,907,178.

U. S. Considers Ford Offer for Big Plant

Muscle Shoals Nitrate Property May Be Taken on 100 Year Lease

DETROIT, July 18.—Announcement made in AUTOMOTIVE INDUSTRIES three weeks ago that Henry Ford had inspected the huge Government nitrate plant at Muscle Shoals with a view to making an offer for it has taken concrete form and Congress now is considering an offer from him to lease the property for 100 years. He has submitted the following proposals through the Secretary of War and the Secretary of Commerce:

First—He will take a 100 years' lease upon the Wilson Dam and No. 3 Dam and electric installation when completed. This work is estimated to cost $28,000,000. After a short preliminary period, Mr. Ford proposes to pay interest at the rate of 6 per cent on the sum of $28,000,000 and to amortize not only this sum but of the entire cost of both dams over a period of 100 years.

Second—To purchase all nitrate plant and equipment, lands, steam plant, etc., for $5,000,000.

Third—To convert and operate the large nitrate plant (No. 2) for the production of fertilizer compounds and as a stand-by for Government explosives in case of war, and to keep it up to date in both lines.

Fourth—To limit the profits of the fertilizer plant to 8 per cent; an independent board embodying representatives of the American Farm Bureau and the National Grange and the Farmers' Union to certify to this maximum.

The completion of these works makes the Tennessee navigable to Chattanooga and there are undertakings by Mr. Ford for maintaining the locks, etc. The power development will ultimately greatly exceed the requirements of the fertilizer plant, and Mr. Ford proposes to use it in his own business. In order to meet the annual payments proposed, a very large use of power must be made outside the fertilizer works.

U. S. Ready to Lease

Secretary Weeks has several times expressed his willingness to recommend to Congress that appropriations necessary to complete the work at Muscle Shoals be made, provided some substantial business concern would agree to take over the project on such terms as would benefit the nation and the Government.

Ford has made no statement regarding the use he proposes to make of the surplus power, but it is understood he intends to operate on the banks of the river a southern unit of his automobile factory from which he will be able to serve a huge territory at lower costs. There also are reports that he intends to specialize in tractor development in the South. It also would be possible for him to sell power for manufacturing plants over a large area.

CAR BUYERS EMPLOY MONEY-SAVING PLAN

NEW YORK, July 18—Passenger car dealers have had experience lately with a new variety of automobile shopper. This person, who does not own a car and so would have none to trade, goes around to a second hand dealer and gets a loan of a used car and a statement of the price for which he can buy it. He then takes the used car and goes shopping around to new car salesrooms, doing his best to trade it in for a new car at an allowance which will give him a considerable margin over the used car price fixed by the used car dealer.

This custom, which has become quite prevalent and which is depriving dealers of the few remaining prospects who made "clean" purchases, has had quite a demoralizing effect on retail sales conditions as a number of dealers have gone into the business of overbidding each other on an allowance for the used car.

See Attempt to Put Over Burke Bill on Hoosiers

INDIANAPOLIS, July 20—Rumors that the State administration would attempt to duplicate in Indiana the Burke bill passed in Ohio this year, are being investigated by the Indiana Automotive Trade Association. It is said that the bill will be drawn for the State highway commission at the instance of Governor McCray and that it will be introduced in the "next legislature" with administration backing and steering it. This is taken to mean that Governor McCray will call a special session of the legislature this fall, for the "next legislature" would not convene until 1923, and preparation of a bill at this time would be premature unless there is some early prospect of a legislative assembly.

In conference with Tom Snyder, secretary of the Commercial Haulers Association, L. M. Shaw, general manager of the Indiana Automobile Trade Association, this week began formation of defensive plans to combat the effort of the administration, which is taken to mean that the administration does not intend to build up the State highways for modern traffic but hopes to meet the situation by eliminating the heavy duty equipment. Secretaries Shaw and Snyder propose to have a conference of all motor vehicle interests of the State with the State Highway Commission.

ABANDON AVIATION MEET

DETROIT, July 19—The Detroit Aviation Society has decided to abandon the Pulitzer trophy and other events which were to have been held Sept. 8, 9 and 10 because it has been impossible to get assurances of entries by the army and navy.

Garage Equipment Needed in Belgium

U. S. Consul Reports Lack of Free Air Devices and Other Accessories

WASHINGTON, July 20—Manufacturers of automobile accessories will be interested in a report just received by the Bureau of Foreign and Domestic Commerce from James P. Moffitt, American Consul in Charge, Antwerp, Belgium, regarding the market for automobile air compression and garage equipment in that place. The report states that there are about 2500 automobiles, 500 trucks and 800 motorcycles in Antwerp. Of the 80 public garages, large and small, there are only about 30 important ones. The number of cars housed in a garage varies from five to 20, though the average number is more likely to be from 10 to 20. Garages in Antwerp, it is stated, do not equal American garages in size or efficiency.

Generally speaking, the equipment is not designed to save labor, but requires the least outlay and is confined to the absolute necessities. Garage equipment, as is used in America, it is pointed out, is not used in Antwerp, first, because it is not known, and, secondly, due to the small number of cars, garage owners go rather slowly in making investments. Labor always has been cheap, and time is not essential. However, due to the present high cost of labor, compared with prewar prices, it seems the opportune moment to introduce American garage equipment.

Only a few garages are equipped with mechanical air compressors, and there are no service stations which offer free air facilities from curb hose lines to the passing motorist. Two garages have systems from Luchard, Paris, whereby compressed air is stored in tanks and the tank is carried from one car to another to inflate tires. Smaller tanks are filled to be carried along with the car. Even this system is very expensive.

CLOSE IMPORTANT CONTRACT

NASHVILLE, TENN., July 18—The signing of the final draft of the important contract between the Southland Motor and Body Corporation and the Nashville Industrial Corporation brings into existence the largest operation of this kind in the South. Reconstruction work on the big building leased by the company is under way and the company expects to make initial deliveries on orders the next sixty days. Representatives have been established in most of the southern cities to handle the direct sales to automobile agencies and garages. At the beginning the new plant will manufacture commercial bodies for Fords on contracts with large users such as mail order houses. The product will be known under the trade name of Old Hickory. About 150 people will be employed at the start.

Col. Clifton Honored on 16th Anniversary

Directors of N. A. C. C. Give President Painting in Recognition of Long Service

BUFFALO, July 18.—In recognition of his sixteen years' service as a leader in the automotive industry, the directors of the National Automobile Chamber of Commerce to-day presented Col. Charles Clifton, president of the Pierce-Arrow Motor Car Co., with a handsome painting to be added to his private art collection. The picture was "Le Palais Rouge," a scene in Venice painted by Henri Le Sidanier.

The presentation was made at the Country Club in behalf of the directors and through them of the entire industry, by Alvan Macauley, president of the Packard Motor Car Co. The gift was deemed especially fitting at this time because Colonel Clifton was elected president of the N. A. C. C. for the eleventh successive term at the annual meeting in New York last month. The directors were in Buffalo for the monthly meeting, which has been held here once a year since Colonel Clifton became president.

In making the presentation, Macauley said that people usually wait until a man dies before they laud his efforts, but that in the case of Colonel Clifton his services to the industry had been so great and had extended over such a long period that it was considered a privilege to give him the painting as a token of appreciation for his valiant services.

Colonel Clifton had been a leader of the industry for sixteen years, Macauley said, and it was due largely to his able guidance that the industry had grown so rapidly from infancy to the leadership of all finished products. He described Colonel Clifton as "the father of co-operative competition."

$1,500,000 Tire Plant to Be Erected in Tampa

TAMPA, FLA., July 20—A tire and tube manufacturing plant, valued at $1,500,000, will be built in Tampa in the near future by the Peninsula Tire and Rubber Co. The company has already been organized and the site for the factory, situated on the Atlantic Coast Line and Seaboard Railways just outside the eastern boundary of the city in a section known as Gary, has been purchased. A building two stories high, approximately 100 by 300 feet in dimensions, and having a floor space of 60,000 sq. ft., will be erected.

The construction will begin within 90 days and operation of the plant will start in about six months. One hundred tires and tubes a day will be manufacturing capacity of the plant in the beginning.

H. A. Van Auken has been named general manager of the new manufacturing concern. He was at one time sales manager for the Northland Rubber Co. of Buffalo, N. Y., which was later absorbed by the Kelly-Springfield interests. He was also sales manager for the Mutual Tire and Tube Co., a co-operative distributing agency.

At the present time tires and tubes being sold by the Peninsula Tire and Rubber Co. are being manufactured under contract with the Doff Rubber Co. of Atlanta. The present contract will be continued until the new plant is completed.

Capitalists To Back Making of Doble Car

SAN FRANCISCO, July 20—Backed by a number of capitalists of this city, and with Abner Doble, designer of the car, as a member of the corporation, an organization has been formed here to start construction of the Doble steamer, as soon as a factory site can be obtained. One of the first models, one that has run 57,000 miles with no sign of trouble to date, is on exhibition here. The directors of the new corporation are said to be prominent financially, and it is understood that no stock is for sale, and none will be offered, all having been taken by the men who have formed the organization. No names, other than that of Doble, have been made public as members of the corporation, but the announcement is generally regarded as reliable. Production of 500 cars a year is contemplated.

The Doble-Detroit Motors, Inc., was formed in 1916, but the War Industries Board ruled against it, and it dropped from active production after booking $27,000,000 worth of business.

Coast Firm Gets Large Tire and Tube Order

OAKLAND, CAL., July 20—The Coast Tire and Rubber Co. of this city announces the receipt of an order from a firm of distributors in Tokio, Japan, for $53,000 worth of tires and tubes, including both fabric and cord tires in a variety of sizes. This is one of the largest orders ever placed by a Japanese house with an American tire manufactory.

This brings the total amount of tire and tube orders in the hands of this company up to an even million dollars, and additional machinery has been ordered for the local plant. Cities of Portland, Seattle and Spokane have ordered tires from this factory for their municipally-owned automotive vehicles.

MAKING SPECIAL CAR IN SOUTH

SAN ANTONIO, TEXAS, July 20—The Robertson Co. has started the manufacture of an automobile especially adapted to Mexico, Texas and the Southwest. Specific claims are made for gasoline and lubricating oil economy and the design has been especially worked out for pulling on mountains, sand, rock and mud roads. It is understood that the factory is financed by Mexico and Texas capitalists.

N.A.C.C. Seeks End of Insurance Evil

Detroit Conference Will Hear Protests—Threaten Mutual Organizations for Nation

NEW YORK, July 20—Vigorous protests against evils which have grown up in automobile insurance will be made by the insurance committee of the National Automobile Chamber of Commerce, headed by William E. Metzger, to the Automobile Underwriters Association at Detroit to-day. The underwriters will be told flatly that unless they take adequate steps to remedy these evils mutual companies will be formed in all parts of the country to take over the automobile business. Companies of this nature are already operated by the Automobile Club of America and by the Chicago Motor Car Co.

The N. A. C. C. committee has attempted for some time to co-operate with the underwriters, but has found that the co-operation on the part of insurance companies has consisted in counting up their losses for the previous year and doubling the rates. It is contended that the companies do not take the moral hazard into account in writing insurance and will give a notorious crook the same rate that is granted to a reputable business man.

Another evil of which complaint is made is over-valuation. Cars are now insured for such amounts that it is almost an incentive to destroy them.

Serious objections also will be raised to the demand of the Underwriters Laboratories at Chicago, which are maintained by the insurance company, that all materials which go into a manufacture of motor cars must be approved by the laboratories under penalty of being subjected to a higher rate.

OSHKOSH TRACTOR TO MOVE

STEVENS POINT, WIS., July 18—The Farmers Tractor Corp., originally established at Oshkosh, Wis., has completed the transfer of its business and offices to Stevens Point, Wis., where temporary works have been opened pending the construction of a machine and assembling shop during the fall and winter months. A. J. Patch is vice-president and chief engineer. The company announces the appointment of Page, Beck & White, Inc., mechanical, automotive and industrial engineers, to act for it in a consulting capacity in matters pertaining to manufacturing plant, building and construction.

COLEMAN TRACTOR IN COURT

KANSAS CITY, MO., July 20—Bankruptcy proceedings have been brought against the Coleman Tractor Co. by the following creditors, with amounts owing them: B-R Electric Co., $30.59; Butler Mfg. Co., $517.95; Bonniwell-Calvin Iron Co., $1,688.88.

3622 Machines Sent Back from Overseas

Heavy Traffic for Fiscal Year—Exports Off Over $33,000,000 from 1920

WASHINGTON, July 21—Preliminary figures compiled by the Bureau of Foreign and Domestic Commerce for the fiscal year show that 3,622 American made motor vehicles with a value of $5,789,163 were returned to this country without payment of duty. The number for June alone was 518 with a value of $911,785. The records do not show what proportion of the reimportations were the result of cancellation of orders.

Imports of foreign made vehicles for June were 34 with a declared value of $63,029 and the total for the year was 1,051 vehicles valued at $1,264,108.

June exports of passenger cars were 1,964 machines valued at $2,057,490. The total for the year was 84,430 with a value of $103,786,970, a decline of $21,598,055 in value from the previous fiscal year. Exports in June, 1920, were valued at $14,486,362.

Truck exports for June numbered 418 machines valued at $531,234, making a total for the year of 17,598 vehicles valued at $29,511,955, a decline of $12,065,729 from 1920. Truck shipments in June, 1920, numbered 2,697 valued at $4,216,502.

Exports of automobile parts, not including engines and tires, for June, 1921, were valued at $2,211,528. This was almost double the May, 1921, exports which were valued at $1,171,071, with a total for the fiscal year of $67,409,570, an increase of $1,116,818 over 1920. Exports for June, 1920, however, were valued at $7,429,188.

Total exports of automotive engines decreased in value $10,784,195 to a total of $23,526,568 for the year. There was a decrease for the year of $5,747,689 in the value of tractor engine shipments.

NEWS BULLETINS

DETROIT, July 21—To finance the production necessary to meet current orders, the Lincoln Motor Co. has arranged to issue bonds to the amount of $2,500,000. Half of this issue already has been purchased by the directors of the company. This arrangement makes $1,250,000 available immediately and leaves the other half of the bond issue in reserve for an emergency. The issue is secured by first mortgage on the fixed assets of the company. The same group of men is continuing its indorsement of all bank notes. Production is running at the rate of 300 cars a month and orders are highly satisfactory. More than two thousand Lincoln cars have been placed in the hands of owners in the past eight months. The inventory is being balanced and reduced and more than $1,000,000 has been paid on trade acceptances since the beginning of the year.

TOLEDO, July 21—John N. Willys, who arrived here yesterday for a conference of the Willys-Overland factory, announced that the company would make "a very substantial payment" on its bank indebtedness on August 1. The company now has $10,000,000 in cash, he said, and its bank obligations total only $20,000,000. Willys said there would be no further reductions in price of Willys-Overland cars.

NEW YORK, July 21—The Netherlands Aircraft Mfg. Co., of Amsterdam, Holland, controlled by Anthony G. H. Fokker announces that it soon will begin the manufacture of Fokker 'planes of all types in this country.

NEW YORK, July 21—The Federal Reserve Bank of New York has reduced its rediscount rates from six per cent to five and one-half per cent on all classes of eligible paper. The reduction is the third this year from the peak rate of seven per cent. The five and a half per cent rate also has been established by the reserve banks of Boston, Philadelphia and San Francisco.

Delay Refinancing of the Willys Companies

NEW YORK, July 18—Refinancing of the Willys-Overland Co. and the Willys Corp. has been delayed by the reluctance of the preferred stockholders to give their assent to the issuance of mortgage bonds. One of the provisions in all the Willys preferred stock is that the consent of 75 per cent of the holders must be obtained before any securities can be issued. The bankers committees will issue a report this week telling of the progress which has been made, but it will make no reference to the tentative plan agreed upon. Notwithstanding the delay, it is certain that the financial affairs of the companies eventually will be worked out in a satisfactory manner.

The Willys-Overland Co. is making a highly satisfactory sales showing and the same is true of the Electric Auto-Lite Co. The New Process Gear Corp. also is receiving substantial orders. It is understood that when the reorganization and refinancing are worked out, the big Elizabeth plant, now a part of the Willys Corp., in which the "Chrysler Six" will be built, will be a separate unit, although there will be no change in its control.

Report Says Ford Will Cut Cars in England

LONDON, July 8 (By Mail)—The outstanding automobile event of this week is the further reduction of Ford prices and the report current in inner trade circles that a further drop is impending. The present price of the Ford touring model is $1,100 (at pre-war rate and the price reported as likely to follow would reduce it by a further $100 to $200.

Reorganization Plan for Mercer Motors

Purchasers Found For Bonds If Creditors Take Notes for 80% of Claims

NEW YORK, July 21—After months of laborious effort, the committees representing bank and merchandise creditors have evolved a satisfactory plan for the reorganization of the Mercer Motors Co. This plan has been accepted by the representatives of both classes of creditors.

As a preliminary it calls for an agreement with the officers and directors of Hare's Motors, the selling organization, for the cancellation of all contracts and options. The committees have expressed formally their appreciation of the helpful attitude of Hare's Motors and it is recognized that general conditions rather than lack of ability on the part of the executives were responsible for the difficulties of Mercer.

Purchasers have been found for $500,000 of first mortgage bonds, which will provide working capital, contingent upon the issuance of $2,000,000 in sinking fund collateral notes bearing 7 per cent interest, which both bank and merchandise creditors would be expected to accept for 80 per cent of their claims. If the creditors agree to this proposal they will be paid 20 per cent of their claims on Aug. 1 or as soon thereafter as possible and an additional 5 per cent before Dec. 31. The notes would be secured by the assets of the Simplex Automobile Co., Inc., and 50 per cent of the net earnings of the Mercer company would be paid over to a trustee for the benefit of creditors.

The purchasers of the bonds would insist upon the resignation of all the present officers and directors and the right to elect a new board as well as a release from the contract with Hare's Motors.

It is proposed to redesign the Mercer car and get it on a commercial production basis of 30 cars a month this year and to double that output in 1922.

A letter will be sent this week to bank and merchandise creditors of the Locomobile Co. asking them for an extension of time, probably for six months, in the hope that by the end of that period some plan can be evolved for the reorganization of that company. If an extension is granted it is believed this can be done.

Goodyear Has Best Week in History of Company

AKRON, OHIO, July 18—Goodyear Tire & Rubber Co. dealer sales for the week ending July 16 were the largest in the history of the company, officials report, with sales to dealers of more than 72,000 complete tire units. Tire stocks are low, according to expert analysts, and present indications point to a shortage of tires if the present rate of buying keeps up, unless all manufacturers at once increase production.

No Entangling Alliance for Durant

Mergers Not Planned Stockholders Told

Statement Says Company Does Not Intend to Monopolize Industry

NEW, YORK, July 20—Most of the innumerable rumors about the ultimate plans of W. C. Durant are set at rest by the definite statement of policy contained in a statement which will be mailed this week to stockholders of Durant Motors, Inc., outlining the progress made thus far in developing the enterprise. In this connection the statement says:

"Durant Motors, Inc., was not organized for the purpose of monopolizing the motor car industry or effecting a combination, merger or consolidation of existing companies in either motor car or accessory lines, and, regardless of rumors to the contrary, will consider no combination, mergers or entangling alliances with any firm or corporation identified with the production of automobiles at this or any future time.

"Durant Motors, Inc., was organized to build a line of popular priced motor cars designed by Mr. Durant, the business owned by Mr. Durant and his close associates, with no partner other than the investing public."

This disposes of the popular belief that Durant is building up his new enterprise with a view to selling out to the General Motors Corp. when it is built up to the right proportions. It also settles the report that he has acquired a very substantial interest in the Studebaker Corp. in the expectation of merging that company with his.

It can be stated, however, that the proceeds of sales of Durant stock are working and earning dividends. In fact, it is understood that the investments made have been so profitable that it would be possible at this time to pay a dividend on all Durant Motors stock which has been sold.

In addition to these statements in regard to policy, the letter to the stockholders says:

The Durant Statement

"Since its organization in January, 1921, three companies have been incorporated and are being independently financed to assemble the Durant line of popular priced cars. These are:

"Durant Motor Co. of New York.
"Durant Motor Co. of Michigan.
"Durant Motor Co. of California.

"Each of these companies, with respect to policy, product, operating and sales, will be controlled by Durant Motors, Inc. The parent company will be responsible for and assume all engineering expenses in addition to providing proper and dependable sources of material supply. For this service and the use of patents, inventions, name, etc., Durant Motors, Inc., is to receive a major participation in the profits.

Will Produce in August

"Durant Motor Co. of New York, capitalized at $3,000,000, will assemble the Durant car at Long Island City for distribution in the Atlantic Coast territory and export markets. The plant has a capacity of 25,000 cars a year and will be in production next month. F. W. Hohensee, president and general manager of the company, was formerly in charge of the operation of the entire group of Chevrolet factories.

"Durant Motor Co. of Michigan, capitalized at $5,000,000, with headquarters at Lansing, Mich., is building in that city a modern plant with a capacity of 40,000 cars a year. The building contract specifies completion by November 1 next. E. Verlinden, who has been responsible for the development of the splendid business of the Olds Motor Works, is president and general manager of the Michigan company, which will assemble and distribute the Durant car in the territory between the Adirondacks and Rocky Mountains.

"Durant Motor Co. of California, capitalized at $3,000,000, has secured an excellent location at Oakland, Cal., and plans are now being drawn for a modern plant having a capacity of 20,000 cars a year. Construction work will go forward on a schedule to permit automobile production in March, 1922. R. Clifford Durant, who until recently was at the head of the Chevrolet Motor Co. of California, is president and general manager of this company, which will assemble the new Durant car for distribution in the Pacific Coast territory.

Get Another Plant

"In addition to the above:

"Durant Motors, Inc., will on August 1, 1921, come into possession of the splendid plant in Muncie, Ind., now being operated by the Sheridan Motor Car Co. Division of General Motors Corp. A new company to be known as Durant Motor Co. of Indiana, capitalized at $3,000,000, will be organized for the purpose of manufacturing at Muncie an exclusive six-cylinder car to sell at a popular price. D. A. Burke, formerly manager of the Chicago branch of the Buick Motor Co., will, as president and general manager, direct the affairs of the new operating company."

When Durant comes into possession of the Sheridan plant the name of the car will be changed to the "Durant Six."

Deny Sale of U. S. Cars at Cut-Rate Prices

Official Report Says Ex-Service Men Are Not Getting Machines Cheaply

WASHINGTON, July 20 — Official denial was made to-day to reports that the War Department had changed its policy of selling surplus motor vehicles by offering for sale, in blocks of ten, Ford runabouts and touring cars at nominal figures. The statement that trucks and touring cars are being sold to men in the service and ex-service men at cut rate price and that trucks are being leased for one hundred dollars per year, were branded as erroneous. The official statement reads:

"The only motor vehicles available for sale at this time are unserviceable ones. Under acts of Congress all serviceable automobiles not required for the use of the army are transferred to other Government departments to meet their requirements. The unserviceable cars—those not desirable by any other department—are offered to the public at public auction. Less than 10,000 unserviceable motor vehicles had been sold to July 9, 1921. More than 42,000 serviceable cars had been transferred to other Government departments up to that date.

"The records show that to July 3, 30,303 automobiles had been transferred to the Public Roads Bureau, Department of Agriculture, the Post Office Department had requisitioned 8286, the Public Health Service 1565, the Engineer Corps River and Harbor Works 305, and the Navy and Marine Corps 1273.

"A total of 51,444 motor vehicles had been disposed of to July 9, to which 41,955 had been transferred to other Federal bureaus."

TIRE PRODUCTION 70,000

AKRON, July 19—Tire production in this city now exceeds 70,000 which approximates 60 per cent of capacity for all factories. Goodyear is making 24,000 a day. Firestone 21,000, Goodrich 15,000, Miller 4,500 and the smaller companies a total of about 7,000.

DETROIT EMPLOYS 4,333 MORE

DETROIT, July 18—Reports from the 79 members of the Detroit Employers Association for the week ended July 12 showed 113,131 men on the payrolls, an increase of 4,333 over the previous week. There were 14,782 workers on part time, however, as compared with 9,251 the week before. Ford Motor Co. is running at full speed and contemplates a July production of 109,000.

Export Trade Shows Improvement

Business Increases in Foreign Fields

Export Lists Show General Improvement in June—Automotive Trade Leads

NEW YORK, July 19—Business conditions in many of the foreign countries making up the export lists of the American automotive companies showed general improvement during the month of June, according to the monthly cables received by the Bureau of Foreign and Domestic Commerce from its trade commissioners and commercial attaches in the larger capitals of the world. This was especially true in Australia, China, France, Great Britain, Germany and South Africa.

Demands in Spain

Of special interest to the automotive trade is the dispatch from Commercial Attache Cunningham at Madrid that the demand in Spain is reviving and sales increasing of American automobiles, accessories and equipment, despite the fact that the Spanish markets are generally overstocked. Likewise of concern is the statement, dated July 5, from Singapore that German motor trucks are selling steadily in the Dutch East Indies. Aside from this indication of activity, Trade Commissioner Fowler declares that business is very dull and that there is little demand for imported commodities.

Little change in regard to other countries is reported. The process of deflation is continuing, but slight improvement is recorded by the trade observers.

The financial situation in Australia is reported as having shown some improvement, despite the decline in exchange and stocks of import merchandise have been reduced somewhat, resulting in inquiries being renewed in some lines. Commissioner Farin believes that wholesalers may begin buying again after the stock taking and closing of the fiscal year on June 30.

Chinese Outlook Better

The Chinese trade outlook is stated to be better than at any time during the last year. With less speculation in silver, the financial situation is improving and June settlements on the Shanghai stock exchange were the most encouraging since the armistice. Activity in highway and road construction is reported in North China.

Unrest and strikes have increased in Japan and money has become tighter, although bank loans have increased. No transactions of any importance are reported from the Straits Settlements and business remains at a standstill.

Trade Commissioner Butler, however, describes increased activity from Paris, where many new loans are being authorized for purposes of reconstruction and improvements. The labor situation is said to be growing more satisfactory. French war stocks have been liquidated to the value of 6,000,000,000 francs, leaving about 750,000,000 yet to be cared for. It is estimated that 18 months will be required for the complete liquidation of all French and American army supplies.

The financial and industrial situation in Germany has improved and checking and savings accounts in the banks are increasing. Unemployment is decreasing and great betterment was shown in June in the boot and shoe, clothing, cotton spinning and woolen goods lines.

The crisis of the readjustment will not be reached in Italy before August or September, it is stated, and unemployment is decreasing, although there seems to be less tendency toward unrest and industrial strikes. The depression in trade and finance in Scandinavia shows no signs of improvement, although deflation is occurring and speculation is decreasing.

Optimistic Feeling

Contrasted with this, however, is a general feeling of optimism in England. This is due to the reduction of the bank rate and the settlement of the coal strike. Prices of cotton, silk, hides, foodstuffs and flour showed some tendency to strengthen during the latter part of June but the prices of wool, flax, jute, sugar, coffee, wheat, oil, rubber, copper, tin and iron weakened. Settlement of the engineering trade wage dispute relieved a grave industrial situation. All of which brings forth the comment that the British industrial situation presents a bright aspect.

Argentina was reported in about the same condition as in June. There has been a notable improvement in the labor situation.

British Automobile Makers Will Convene

LONDON, July 1 (By Mail)—A conference of British automobile makers and British automobile dealers throughout the world is fixed for the latter part of the month. The conference should do something to explain to British automobile makers why they have lost so much ground overseas. Other nations have the labor evil factor to contend with, and beyond all there is the fact that American labor is paid at a higher rate, apart from the workers' earning and being able to earn more than the British worker, yet produces and sells so much cheaper and having 83 per cent of the world's trade. This is one of the problems the conference needs to solve.

Ford Sales Multiply in Peruvian Cities

A. C. Shumway Opens Branches in 11 Cities—See Good Chance for Higher Priced Cars

LIMA, PERU, June 30 (Special Correspondence)—Two features in the automotive market of Peru have become prominent in the last year, although in a certain manner they are contradictory to each other. The first development in Peru is the extensive plan formed for the marketing of Ford automobiles, trucks and tractors.

The Ford representative in this country, A. C. Shumway & Co., with head offices here and from which it also handles the business in Callao, has opened branches and sub-agencies in eleven other cities and towns. The branches are at Pisco, Ica, Chincha, Trujillo, Chiclayo and Huancayo and the sub-agencies at Canete, Huacho, Supe, Piura and Pacasmayo. These localities range in population from 4000 to 22,000. Many of them are seaports, but each is the center of a rich agricultural or mining territory which heretofore has not been properly represented by automobile dealers and service stations. The Shumway branches will handle only Ford products and do Ford service work.

Right in Market

Automotive manufacturers and sellers of automotive products should watch these places and get in touch with dealers in the same cities. These places are now markets for Ford parts, tires and accessories. Soon, that is within a year or a year and a half, these localities will be markets for higher priced cars than the Ford.

The second development is the arrival of European cars. There are now to be seen in Lima the Fiat, Renault, Daimler, Benz, Opal, Wolsley, Mercedes and Minerva.

Trucks and Tractors

The Fiat and Renault agents have trucks and tractors as well as automobiles. The Daimler has a truck but no tractor. The Daimler, to which reference is made, is an English product. Curiously enough, there is a truck by the same name manufactured in Germany and several of them are in use in Lima. In addition to the German Daimler there is a Bussig, a French DeDion Bouton and a Draga, a Scotch truck. The Fiat, Renault and Daimler are the only companies seriously represented. The other makes are for the most part direct importations by consumers.

Dallas Shows Gain Over June Business

10 to 15 Per Cent Increase in First Ten Days, Dealers Declare

DALLAS, July 20—Canvass of 15 retail automobile concerns in Dallas revealed that sales during the first 10 days of this month showed an increase of from 10 to 15 per cent over sales for the same period in June. Dealers declare this is due to the fact that the marketing of grain crops is pouring some $30,000,000 into the pockets of the grain growers and as this money finds its way into other channels, financial stringency is loosened up and cars are bought.

The same retail houses declare prospects now are better than they have been in many months and say they expect to do a banner business during July and August. Another cause of increased sales is said to be the season for touring. Reduced prices were a decided factor in increased buying.

In addition to retailers reporting increased sales for the first 10 days of July, the used-car dealers declare they have never had better business. Retailers claim they are having more inquiries for cars right now than they had for a year and that generally these inquiries lead to sales.

Accessory and tire men also reported improved business during the early part of July. It is learned from wholesalers here that the automobile business over the territory generally is improving and that sales have increased during July.

Denver

(*Continued from page* 136)

ness about further price drops, though some dealers report slower business. One dealer has sold six cars in July against 18 for the first half of June, but he had a rush then because the June 1 price drop attracted waiting buyers. He is now short on certain models demanded and also says July always was a slow month.

Another dealer reports 12 cars sold in July at retail against only three in June for the same period. This dealer believes that price restlessness largely has been overcome and another distributor expects his July total to exceed June sales of 44 at retail and wholesale.

Exact registration comparison is impossible because no July licenses are yet entered on the State records but leading dealers lean toward a slight gain.

Atlanta

ATLANTA, July 20—Automobile business as a whole is less so far in July than in June for the same period. Companies reducing prices July 1 are experiencing a good increase, but there has been a considerable falling off in sales of those cars reduced June 1. Ford sales are reported exceptionally brisk. Recent reduction in discount rates of the Federal Reserve Bank of Atlanta does not appear to be having any effect on sales. Continued low price of cotton is seriously affecting all lines of business and sales of automobiles to farmers as a result are far below normal.

It is too early in July to give an accurate comparison with June business, but as a whole dealers say business has been experiencing an upward trend in the past two or three months. This is exclusive of the stimulation caused when price reductions were announced.

Louisville

LOUISVILLE, KY., July 20—As the season progresses, automobile sales are increasing rather than falling off, according to opinions of leading automobile dealers here.

Outstanding facts seem to be as follows:

The number of new purchasers of new cars is steadily increasing. That is, the number of persons buying cars who have never owned cars, and have not in consequence any "trade-ins," is increasing. This is particularly encouraging to the dealers, since the main end of the business must always be the sale of new cars. Price reductions, which have been on practically every make of automobile sold in Louisville, have established the market and created a new demand for automobiles.

On high priced cars, business, while apparently slow, is shown to be normal for this season of the year by a comparison with the last five years. The reason this class of cars moves slower now than during the spring and fall seasons is that purchasers of high-priced cars are away from the city during practically all of the summer.

New Orleans

NEW ORLEANS, July 20—Four out of five largest local dealers say the first part of July sales are under for the same period in June when business was stimulated by price reductions. The Dodge distributor sold 95 cars in June and is doing about 60 per cent of this business in July. United Motor Car Co., Peerless distributor, reports very light July business.

Capital City, Studebaker dealers, report sales about one car per day, slightly under the June rate. Bernstein Glenny Co., Buick distributor, reports total sales for spot and future delivery and used cars in excess of June. Cadillac reports about 50 per cent of June business.

Production Figures Sought by Nation

Director of Census Calls Conference of Representatives of Automotive Industry

WASHINGTON, July 18—Director of the Census Stewart will hold a series of conferences with representatives of the automotive industry and other large trade and craft organizations to discuss the manner and methods for collecting and publishing production statistics for 1921. The meetings will be under the auspices of the National Association of Manufacturers, although non-member organizations will participate, because it is purely a Government conference.

Secretary Hoover has given directions to the Director of the Census to collect current commodity statistics under the provisions of Section 8 of the act of Congress of Feb. 14, 1903, which authorizes the secretary to make such special investigations and reports "which he, himself, may deem necessary and urgent." The primary design of this conference, the association has announced, is to determine the character and form of the schedules to be used in the collection of the census of 1921, which work begins Jan. 1, 1922, and to relate such work to the collection of such current commodity statistics as are desired by the Secretary of Commerce and which may be useful to the industries of the country.

The conference will be of the same general character as that assembled by the National Association of Manufacturers at the invitation of the Director of Census in 1919 and which proved of such value as to call for commendation of the director in the annual report for the year 1920.

President Edgerton will promptly issue a call for the conference which, it is stated, may result in the working out of a method of direct co-operation between trade and craft organizations with the Bureau of the Census, whereby they may collect for and on behalf of the census and themselves the figures relating to their industry.

Toledo

TOLEDO, July 20—Automotive dealers here believe that the buyers' strike, as far as it effects automobiles and accessories, has been broken.

The retail sales here show that to be the fact. Every dealer made a record during the month of June, and sales are continuing well this month.

The lowering of prices has demonstrated that people have had the money to buy but were waiting. Toledo dealers have been amazed with the amount of cash business they got these days. In the last six months or more nearly 80 per cent of the automobiles sold here have been on payment plans.

Chevrolet Prices Cut Second Time

Reductions on All Models, Effective July 15 Announced in Detroit

DETROIT, July 20 — Another reduction in prices on all models in both its lines has been made by the Chevrolet Motor Co., effective July 15. In the "FB" line the touring car and roadster have been cut from $1,185 to $975 and the coupé and sedan from $1,885 to $1,575. On the "490" models, the touring car has been reduced from $645 to $625; the roadster from $635 to $625; the sedan from $1,195 to $975 and the coupé from $1,155 to $975. The prices are f.o.b. factory. This is the second of the General Motors Corp. subsidiaries to make a second price reduction since the readjustment began. The Oakland led the way.

KISSEL MAKES SECOND CUT

HARTFORD, WIS., July 20 — A second reduction in prices is announced by the Kissel Motor Car Co. The standard touring car is reduced from $2,775 to $2,475, a total cut of $1,000 since the price readjustment began. The following reductions are made on the "de luxe" models: Speedster and touring car, from $3,475 to $2,975; coupé and sedan from $4,275 to $3,775. This makes a total reduction of $800 on all the "de luxe" models.

FORD CUTS FREIGHT RATES

COLUMBUS, July 18—The Detroit, Toledo & Ironton Railroad, owned by Henry Ford, has filed with the Public Utilities Commission new freight rate schedules making a general reduction in freight rates on the road 20 per cent, to become effective August 2, if the commission approves.

Before Mr. Ford's road can apply reduced freight rate to interstate traffic it will have to file them 30 days in advance with the Interstate Commerce Commission, which may suspend their effectiveness pending investigation if it sees fit. In view of what Chairman Clark has recently said about a general reduction, railroad men think the commission will not approve one at this time.

WANT LOWER RUBBER RATE

NEW YORK, July 18—A hearing will be given by the Consolidated Classification Committee, which represents all railroads throughout the country, on the request of the traffic committee of the Rubber Association of America for a reduction in all territories of the carload rating on crude rubber. The committee wants the rating taken from the fourth class and to the fifth.

BUYERS GET NEW ROADSTER

DETROIT, July 18—The Wills Sainte Claire roadsters are now in production and the cars of this model are already getting into the hands of purchasers. The roadster body is mounted on the standard chassis with a wheelbase of 121 in. The roadster seats two in the front seat and two more in a rumble seat.

The standard colors provided are Lady Mary maroon, Newport blue and Liberty green. The radiator, hub caps and side or courtesy light are nickel plated on the roadster. Like the touring car, the roadster is equipped with disk wheels painted to correspond with the body. The price of the roadster is $3,275 f.o.b. Marysville. This is $75 more than the touring car. Coupé and sedan bodies for the Wills Sainte Claire line are now under construction and will shortly be on the market.

Lansing Plant of Reo Reopens on Schedule

DETROIT, July 18—The Reo Motor Car Co. of Lansing, which closed July 2 for two weeks, reopened to-day on schedule and is operating in all departments. R. C. Rueschaw, sales manager, said that the simultaneous vacation plan which was tried out this year for the first time apparently has been highly successful and unless unexpected opposition develops it probably will be adopted permanently. The trial of the plan by Reo has been watched with interest by several Detroit companies and in view of its success its adoption is likely to become widespread. The opportunity given for plant repair and for a general clean-up of all the production departments is said to have many advantages. Reo has resumed on a full time schedule.

SUE VERLINDEN IN NEW YORK

NEW YORK, July 18—The General Motors Corp., which recently brought suit in Michigan to recover from Edward Verlinden approximately $500,000, which he is alleged to have obtained wrongfully by cashing a check made out in his favor while at the head of the Olds Motor Works, has brought a virtually identical action in the Supreme Court of this State on the theory that he has large property holdings in New York. Verlinden's friends deny, however, that he owns property here.

TRAILER FIRM WILL GO ON

EDGERTON, WIS., July 18 — The Highway Trailer Co., Edgerton, Wis., intends to begin work within a few days on the reconstruction of its main shop building, which was almost totally destroyed by fire on the night of July 4, causing a loss estimated at $260,000, with insurance of about $90,000. Work has been delayed somewhat in order to enable officials of the company to determine the responsibility, if possible. At the request of the concern, the State fire marshal's office is making an investigation of cause. The building was 190 x 875 ft. in size, part two stories, of solid brick, with mill roof trusses and concrete floors.

METAL MARKETS

IN judging whether continuing reports of price cutting in the steel market are based on facts and whether the recently downward revised schedules of the chief interest and the leading "independents" will once more deteriorate into a nominal list observed solely as a means of cutting under, the automotive purchasing agent must exercise extreme caution. As on previous occasions, a large number of steel producers look once more to the automotive industries to set the wheels of representative demand in motion. As far as can be positively ascertained, there has been no price cutting on fresh inquiries. When the Bethlehem and United States Steel corporations promulgated their new schedules some business was in process of negotiation at lower levels than those which these interests announced, and it is these figures which came to light recently and were forthwith interpreted as fresh evidence of a repetition of the previous situation in which "official" prices were gradually undermined by the intensive contest for what little business the market offered. Then, again, there are still innumerable resale transactions in which prices considerably lower than for "production" steel prevail. A Chicago automotive instrument maker offered a few days ago from his surplus free cutting cold-drawn steel at $2.50 cwt. base and hot-rolled strip steel at $2.25 cwt. base, as compared with $2.80 and $2.50 asked by producers. The price named by this reseller for cold-rolled strip steel, however, was $4.25 cwt. base, which is also the producers' price. There has been a good deal of talk about certain sheet mills cutting $5 per ton under the "official" price. This appears to be the result of confusion, certain mills having based prices for certain gauges of sheets on the plate schedule. Buyers are testing the market in every conceivable manner. A bid of $30 for a 500-ton order of sheet bars is a case in point. As stated before, further downward revision of steel prices waits upon two factors, lower freight rates and further downward adjustment of wages. Progress is being made in the latter direction, but as for the former there is still no indication when relief may be expected. There is, therefore, little likelihood of a further cut in "official" prices in the immediate future. Market news is scarce in the dog-days, and it is only natural that there will be frequently recourse to speculation as to when the next change in prices will come. Meanwhile, however, there is a slow but nevertheless perceptible improvement in activities, especially of the smaller mills.

Pig Iron.—Automotive foundries are taking on larger tonnages, especially so because prices are thought to have reached levels at which all risk is eliminated.

Steel.—So far the principal activity in the market for cold-drawn steel bars consists of releases from passenger car builders, with fresh business confined to small tonnages for filling in purposes. The leading builder of low-priced passenger cars is reported to have placed additional orders. Cleveland reports have it that an order for 10,000,000 bolts is about to be placed by a Detroit automotive interest. Most of the sheet business coming out is for less than carload tonnages.

Aluminum.—The Aluminum Co. of America has reduced its base prices, making 98 to 99 per cent virgin ingots 24½ cents, No. 12 alloy 23.80 and sheets 39.10. As a result of this reduction the entire outside market is unsettled and lower.

Copper.—The market is flat and domestic demand conspicuous by its absence.

Tin.—At present prices tin is considered cheap, and some consumers are buying moderately because they consider values advantageous.

FINANCIAL NOTES

Velie Motors Corp., in a comparative balance sheet of Dec. 31, shows assets for 1920 as $7,729,930, as compared with $5,478,529 for 1919. Cash on hand for Dec. 31 is shown as $94,550, against $104,293 for the previous year. Notes receivable are $76,594, and the year previous $5,400. Accounts receivable are $564,301, while the year before they were $666,057. Inventories total $4,686,805, while in 1919 the sum was $3,234,105. The company's liabilities show a gain. The figures for 1920 are $7,729,930 and for 1919 $5,478,529. Notes payable in the new balance sheet come to $1,787,911. In 1919 they were $400,000. Accounts payable are $517,135, against the old figure of $470,379. Other figures are: Profits discounted, 1920, $449,592; 1919, $387,949; surplus, $706,178, 1920; $1,884,970 in 1919.

International Motor Truck Corp. profits for April were $108,000, for May $150,000 and for June $250,000. For the first half of the year they approximated $500,000. This will not cover preferred dividends for that period, but it is an exceedingly good showing for a time of acute depression. Plants are being operated at about 70 per cent of capacity. The company has reduced its inventory $3,000,000 since the first of the year, it has no bank loans and about $3,000,000 in cash.

Peerless Truck & Motor Corp., in a comparative balance sheet filed Dec. 31, 1920, shows calls of $14,919,065, as against $12,928,601. The net income is $1,063,306, as compared with $670,628 in 1919. The assets are $13,854,667, against $15,651,529. Inventories, 1920, $5,410,080; 1919, $3,918,767. Cash, 1920, $421,312, against $1,327,043 in 1919. The surplus in 1920 is $5,603,557, against $5,259,600 for 1919.

Wire Wheel Corp. of America, in a comparative balance sheet filed Dec. 31, shows assets in 1920 of $6,121,305, against $6,239,580 for 1919. Accounts receivable are $229,725, against $336,889; notes receivable, $54,984, against $2,713; inventories, $1,395,883, against $1,049,587; cash, $142,644, against $624,662. Notes and accounts payable, $398,722, against $186,417, and surplus, $1,563,686, against $528,103.

Root & Van Dervoort Corp., in its 1920 comparative balance sheet, shows assets of $7,777,984, with cash of $631,932; receivables, $896,360; inventories, $3,811,917; deferred charges, $39,052. Notes payable come to $3,328,550. Surplus shows $1,466,792.

Franklin Automobile Co. on June 28 paid off the last of its bank borrowings, which on Dec. 31, six months ago, amounted to $4,510,000; on Aug. 31 of last year, when the Franklin inventory reached its peak, bank loans amounted to $4,785,000.

Merrill, Lynch & Co. and Cassatt & Co., are heading a syndicate for the sale of a new issue of $1,500,000 Spicer Manufacturing Corp. ten year 8 per cent. sinking fund gold bonds, due July 1, 1931 at 99 and interest.

American Motor Body Co., in a financial statement for 1920, shows assets of $23,153,028; accounts and notes receivable, $1,191,416; cash, $2,002,854; notes payable, $322,500; accounts payable, $898,371; surplus, $269,457.

Kelly-Springfield Tire Co. announce a quarterly dividend of $2 per share on the 8 per cent preferred stock of the company payable Aug. 15, 1921, to stockholders of record Aug. 1, 1921.

Motor Products Corp. has declared a regular quarterly dividend of $1.25 a share on the Class "A" stock, payable August 1 to stockholders on record July 20.

Mullins Body Corp. has declared a regular quarterly dividend of $2 a share on the preferred stock, payable Aug. 1 to stockholders of record July 23.

Hood Rubber Co., declared the regular quarterly dividend of $1.75 on preferred stock, payable August 1, to stock of record July 20.

Hale & Kilburn Corp., in a comparative balance sheet for 1920, show assets of $4,633,091, against $7,517,637 for 1919.

New Rotarian Will Make Transcontinental Run

HOBOKEN, N. J., July 20—The first Rotarian car to be manufactured by the Bournonville Rotary Valve Motor Co. will be given a transcontinental test run under the supervision of the American Automobile Assn. The engine, which has the Bournonville rotary valve, is the feature of this car and, during the test, the valve mechanism will be sealed. The valve will be calipered before and after the run to show that wear is negligible.

With the exception of the engine, the new car is assembled of standard parts. The important units are as follows: Columbia axles front and rear, Borg & Beck clutch, Brown Lipe gearset, Arvac propeller shaft and Parish & Bingham frame. The body work and equipment will be of the highest class and it is anticipated that the complete car will sell for approximately $5,000. It is believed that these cars will serve to introduce and popularize this type of engine. Later it is intended to license the manufacture of this type of engine.

International Closes Its Springfield Works

SPRINGFIELD, OHIO, July 19—After keeping up above its schedule on light motor trucks for several months and slowing down for the past few weeks the Springfield works of the International Harvester Co. closed Saturday. Those identified with the company stated that the suspension of operations is due to a general slump in the motor truck business. They expect to see business forge ahead again in the early fall. Just when the works will resume operation is uncertain, it is stated.

Newmark Appointed Hawkins's Assistant

DETROIT, July 20.—J. H. Newmark, who for the past five years has been advertising manager of the Chevrolet Motor Car Co. in New York, has been appointed assistant to Norval Hawkins, who is on the advisory board of the General Motors Corp. in Detroit. Newmark has taken up his work in Detroit with his office located in the General Motors building. Newmark has been twelve years with General Motors companies, having served one year with Oldsmobile; six years with the Oakland Motor Car Co. and five with Chevrolet. Previous to his association with the Chevrolet company he was with Apperson Motor Car Co. in Kokomo, Ind.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

During the past week gold reserves of the Federal Reserve System increased $14,738,000, and total reserves $16,383,000. Bills discounted secured by Government obligations decreased $55,593,000, while other bills discounted decreased $41,790,000. The total bills on hand, July 13, were $1,729,115,000 against $1,832,499,000 the previous week. Total earning assets decreased $95,913,000 to $1,999,622,000. Total deposits decreased $19,161,000 to $1,693,991,000, while note circulation declined $68,083,000 to $2,603,803,000. As a result of these changes, the ratio of total reserves to deposit and Federal Reserve note liabilities combined, increased from 60 per cent on July 6 to 61.6 per cent on July 13, while the ratio of gold reserves to Federal Reserve notes in actual circulation, after setting aside 35 per cent against deposit liabilities, increased from 76 per cent to 78.9 per cent. Of the reduction in note circulation of $68,000,000, the New York Reserve Bank contributed over $30,000,000.

Money rates showed a slight tendency to rise during the week by reason of heavy Government withdrawals, necessitated by the retirement of $132,886,500 5½ per cent certificates of indebtedness and the mid-month corporation disbursements. Call money ranged between 5½ per cent and 6½ per cent as against a range of 5½ per cent to 6 per cent in the previous week. Commercial paper rates for 60 to 90 days remained stationary at 6¼ per cent to 6½ per cent for the best grades, with quotations of 6½ per cent to 6¾ per cent for others, but the volume of transactions was comparatively light. Time money for all maturities up to six months was at 6 per cent, rising to 6½ per cent at the end of the week. There was no change during the week in the re-discount rates.

Wholesale prices for June, as indicated by the index number of the Bureau of Labor Statistics, continued to decline but at a relatively slower rate than for any previous month during the last year with the exception of May. The all-commodities index now stands at 148 against 151 for May and 154 for April. This represents a decline of 2 per cent compared with a decline of 1.9 per cent in the previous month. The rate of decline has shown a steady tendency to slacken since the maximum month's decline of 8.7 per cent in last December. Among the individual indexes, that for farm produce, which rose from 115 in April to 117 in May, declined to 113 in June. The food index dropped one point to 132 as also the cloths and clothing index which is now 180. The house furnishing goods index, which is at present the highest, declined from 262 to 250. The index for fuel and lighting declined from 194 in May to 187 in June, and that for metals and metal products from 138 to 132.

MEN OF THE INDUSTRY

Walter C. Lindemann, M. E., of the A. J. Lindemann-Hoverson Co., Milwaukee, was elected president of the Milwaukee Engineers' Society at the annual meeting. He is 34 years of age and a graduate of the University of Wisconsin and the Imperial Engineering University at Charlottenburg. Arthur Simon, of the Cutler-Hammer Mfg. Co., was elected vice-president; Fred H. Dorner, power plant manufacturers' representative, secretary, and Albert Blatz, Jr., president Standard Separator Co., treasurer. Trustees for three years are: M. A. Beck, Milwaukee Electric Crane & Mfg. Co.; Harold Falk, general superintendent Falk Corp.; Herman Schifflin, Allis-Chalmers Mfg. Co.

Rudolf Hokanson, vice-president and general manager Nash Sales Co., Milwaukee, distributer of the Nash line, and his brother, Emil Hokanson, president of the Wisconsin Oakland Co., distributer of the Oakland, accompanied by their wives, depart July 25 from New York on the steamer Paris for Le Havre, to spend about three months in touring Europe. They will visit the battlefields and then proceed to London and Copenhagen, thence to southern Sweden to visit their parents. They will then motor to Stockholm and across Sweden to Norway and back to Gothenburg, returning to America about Sept. 29.

Donald P. Hess has become general manager of the Columbus plant of the Timken Roller Bearing Co., succeeding C. N. Replogle, who has resigned. Hess has been connected with the Timken Roller Bearing Co. at its headquarters plant in Canton, Ohio, for nearly three years as assistant works manager, in direct charge of steel and bearing production. His connection with the automotive industry extends over a period of about ten years, during which time he served as chief of the priority section of the motor transport section in Washington during the war.

H. J. Thorkelson, M. E., formerly assistant superintendent of the J. I. Case Plow Works Co., Racine, Wis., but since 1914 business manager of the University of Wisconsin, Madison, has resigned to become associated with the General Education Board, New York City, to assist colleges and other educational institutions in problems of organization, budget and financial management. Mr. Thorkelson is a graduate of the College of Engineering, University of Wisconsin, 1901.

J. A. Flannery, a well-known automobile export man, has been appointed assistant export manager for the Haynes Automobile Co. of New York, according to an announcement by E. W. Headington, general manager of the New York Haynes company. Mr. Flannery has had wide experience in the export departments of leading American automobile companies, and is a specialist in the analysis of foreign markets, from the sales point of view.

A. W. L. Gilpin, for six years manager of the Milwaukee branch of the Ford Motor Co., has been promoted to district manager, was tendered a banquet at the Milwaukee Athletic Club by 208 Ford dealers of Wisconsin. Mr. Gilpin has transferred his headquarters to Chicago, as manager of the Middle Western branches and assembling plants.

F. E. Greene, who has years of experience in designing and manufacturing in art metal products, will have complete charge of the production and distribution of the English & Mersick Co., which will commence the manufacture of a complete line of artistic interior mountings and fittings, including dome lamps, etc., at New Haven, Conn.

H. M. Salisbury, export manager for the Maxwell Motor Sales Corp., sailed Thursday, July 14, on the S.S. Mauretania for England, France and Holland, where he will spend some time in looking over the field with a view to determining what may be expected from that quarter in the coming year.

INDUSTRIAL NOTES

Allith-Prouty Company, Danville, Ill., has purchased the plant and good will of the D. & G. Shock Absorber Company, manufacturing various kinds of motor vehicle accessories at Crawfordsville, Ind., and has removed the machinery and other supplies to the former's plant at Danville. The D. & G. company is one of the earliest in this field and has been doing a prosperous business for many years. S. E. Kerr, who has been superintendent of the Crawfordsville plant, will be retained by the Allith-Prouty company and possibly a number of the traveling salesmen. For the past six years the purchasing company has been furnishing the castings and various other parts for the absorber company, and it was decided that the overhead expense could be greatly lessened by the consolidation of interests, much of the present administrative cost to be eliminated by the amalgamation. "We hope to increase the production greatly," announced President H. C. Smith of the Allith-Prouty company. "We will make the shock absorber one of our leading lines."

The Moloch Co., Kaukauna, Wis., a consolidation of the Kaukauna Machine Works Co., manufacturer of power hammers and other tools, and the Moloch Automatic Stoker Co., has started operations in its new plant, erected at a cost of $200,000. There are two buildings, each 100 x 250 ft., of brick and steel, consisting of a foundry and a machine and assembling shop. The manufacture of Mayer power hammers, used widely in automotive shops throughout the world, is being increased about 100 per cent, and several larger sizes are being added. The other major department builds automatic stoking devices for boiler houses of steam generating plants.

The A. H. Petersen Mfg. Co., 1614 Fratney Street, Milwaukee, for several years one of the largest exclusive manufacturers of tools and dies in the Middle West, is discontinuing this line and will concentrate on the manufacture of portable electric drills and similar equipment for automotive shops, garages, machine works, etc. The plant is being retooled and a regular production schedule will be resumed about Aug. 1 or 15 with 200 operatives.

Transport Truck Co. has completed arrangements with Keegan, Aprahamian & Co. of New York to take charge of transport business in Japan, China, the Philippines, Dutch East Indies, French Indo-China, Malay states, Straits Settlement, Burma, Ceylon, India, Persia, Egypt, Arabia, Siam, Australia, New Zealand, Tasmania and South Africa.

The Co-operative Axe & Tool Co., Chicago, operating plants in Chicago and Cleveland, Ohio, is establishing a third works in Green Bay, Wis., in an existing building, which is being equipped for electroplating and polishing. Later a steel refining plant and a drop forge shop will be added. E. D. Woods of Chicago is general manager.

The McAvoy Mfg. Co. of Racine, Wis., a pioneer manufacturer of winter tops for passenger cars, bodies, trimming, curtains, etc., has incorporated its business as the Wisconsin Top Co., Inc., with a capital stock of $200,000. The incorporators are C. V. McAvoy, L. M. Johnston and A. M. Kalamatiano.

Republic Rubber Co. (C. H. Booth, receiver) resumed operations in the production of pneumatic tires, tubes and solid tires Monday, July 11, at Youngstown, Ohio. The mechanical goods manufacturing departments will resume Monday, July 18.

McCord Mfg. Co., Inc., reported July 12 that the company had placed its two plants at West Pullman, Chicago, on the market.

Electric Service Men Discuss Rate System

NEW YORK, July 18 — The relation between the car dealer and the electric service station was the principal topic of discussion at the meeting of the eastern section of the National Electric Service Association held here. H. R. Cobleigh of the National Automobile Chamber of Commerce brought out the importance of taking the owners' viewpoint and discussed briefly the advantages of the flat rate system in selling service.

J. H. Hearnan of Trenton, N. J., read a paper in which he emphasized the importance of securing the co-operation of car dealers in getting purchasers of cars to register the electric equipment on the car with the electrical service station. I. McCulla, service manager of the Bijur Motor Appliance Co., presented some ideas on inventory systems.

A dinner was held in the evening at which Harry Tipper, business manager of AUTOMOTIVE INDUSTRIES, spoke on "The Value of Organized Effort."

STORAGE BATTERY MAN DIES

NEW YORK, July 18—The death is announced of Albert Taylor, manager of the North Atlantic district for the Electric Storage Battery Co. He passed away a few hours after becoming ill in his office in this city. His home was in New Rochelle. He was born in Liverpool, England, in 1864. Taylor joined the Electric Storage Battery Co. as a salesman in 1898 after having served with the Edison, General Electric, the United States Electric, the Westinghouse and Stanley Electric companies.

PACKARD SALES ARE HEAVY

NEW YORK, July 18—The Packard Motor Car Co. of New York reports that for the six months ended June 30 it sold 563 passenger cars and 493 trucks in the New York territory. Net profits after all charges were $182,000. July has shown a large increase in "twin six" sales.

Calendar

SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair, conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28 - Oct. 8 — New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January — Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.

Sept. 5, 1921—Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12 — London, British Motor Show, Society Motor Mfrs. and Traders.

March, 1922—Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Associcao Automobilista Brazileria.

CONVENTIONS

Sept 14-15-16—Portland, Ore., Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

RACES

July 25—Grand Prix, Le Mans.

Labor Day—Uniontown, Pa., Autumn Classic.

Start Dredging Hudson for New Ford Factory

TROY, N. Y., July 20 — Work on dredging out the Hudson River at Green Island, near Troy, will be started this week, the first step in the erection of the new Ford Motor plant. A contract calling for four electric generators has been awarded to Allis-Chalmers Mfg. Co. Generator contract calls for the expenditure of approximately $200,000.

Actual construction work on the building of the new power house has been started. The contract was secured by Stone & Webster, who will build the power plant on a Government dam erected some time ago and will have a capacity of 8,000 hp. As announced, Ford Motor Co. will build a tractor plant at Green Island but work on this has not yet been started.

Ford was one of the first to secure a license for erection of power plant under the terms of the Federal Water Power Bill. Permission was given by the Government last May.

Culp Has Distributing Plan for the Tire Field

NEW YORK, July 20—A new plan of organization and distribution in the tire field is being presented by George K. Culp, Inc., this city, the head of which has been connected with the tire industry in various capacities for nine years.

The plan includes the association of a large number of rubber manufacturing companies and a large number of distributers on such a basis that all concerned will have a direct interest in the enterprise. Mr. Culp states that he is in communication with about 40 tire companies and has already practically consummated arrangements with the following:

Combination Rubber Mfg. Co., Bloomfield, N. J., to make Culp cord tires; Semple Rubber Co., Trenton, to make Culp red tubes; Chillicothe Tire and Rubber Co., Chillicothe, Ohio, for Ford size fabrics; Converse Rubber Shoe Co., Malden, Mass.; A. J. Stevens Rubber Co. of Kansas City; C. Kenyon Co., Brooklyn.

The tire stores and distributors which have allied themselves with the proposition include: Bert A. Hosford Co., Denver; City Quick Tire Service Co., Tampa; Marathon Tire & Rubber Co., Milwaukee; H. S. Michael, Baltimore; Murray Tire Service Co., Kansas City; Pace Tire Co., Albany, Ga.; Easton Tire Co., Easton, Pa.

Two Entries Drop Out of French Grand Prix

(By Cable to AUTOMOTIVE INDUSTRIES)

PARIS, July 20—The Talbot-Darracq and Sunbeam entries for the French Grand Prix which is scheduled for July 25 at Le Mans have been withdrawn because of dissatisfaction with the rules of the Automobile Club of France limiting the practice hours. The Fiat entries previously had been withdrawn on the ground that the race would not be representative of the best cars in Europe. As a consequence there is a possibility that the race may be abandoned.

HAYNES ADDS NEW MODEL

KOKOMO, IND., July 19—The Haynes Automobile Co. has brought out a new model which will be known as the Haynes 75. The new car has a six-cylinder engine with cylinder dimensions of 3½ x 5 3/16 in., 132 in. wheelbase and 34 x 4½ in. tires. Prices are as follows: Roadster, $2,685; 5-passenger touring, $2,485; 7-passenger touring, $2,485; Brougham, $3,185; Sedan, $3,485.

FILE INCORPORATION PAPERS

STEVENS POINT, WIS., July 18 — Articles of incorporation have been filed by the Hutter-Shutter Co., which is organized to manufacture a metal device designed for assisting in the heating and cooling of motor car and truck radiators. It is in the form of a shutter operated from the dash or by thermostatic device. The principals are A. D. Hutter, L. F. Hutter and H. M. Hutter.

Suggest U. S. Hold Own Show in Great Britain

LONDON, July 1 (By Mail)—There is some outcry and protest against the refusal of the trade society—the S. M. M. and T.—to readjust the ballot process for allotting spaces at the trade show of cars. Last year's experience of the White City division of the show showed that Olympia had at least 30 per cent better attendance than the White City, and it was proposed that if the ballot for allotment were freed from the preferential or priority accorded to certain vested interests, it would reconcile the trade to a discrepancy which can only be remedied by a building big enough to house the whole show simultaneously.

The obvious course is for the importers of automobiles to frame their own show and run it as and when they like Possibly Olympia will not be available to them, either because it is already booked up, or which is likely, the S. M. M. and T. have a restrictive bond with the owners.

Tests of Tractor Plows in Italy Are Satisfactory

WASHINGTON, July 20—A trial giving satisfactory results was recently made at Sarissola, near Genoa, of tractor plows manufactured by the Ansaldo Co., in their plants at Sampierdarena, where they have now begun on a large scale the manufacture of agricultural machinery and implements, for which until lately Italy was entirely dependent upon foreign countries, states a report from American Consul General John Ball Osborne, Genoa.

The Ansaldo Co. has undertaken the manufacture of all the various types of plows, 40 in number, needed for the different kinds of Italian soil, which vary greatly according to the locality, so that it can now compete, both for quality of material used and accuracy of work and price, with all the foreign houses manufacturing special types of plows.